Markscheme

May 2025

Digital Society

Standard level

Paper 1

18 pages

1. **Microtransactions in gaming**

(a) (i) Identify **two** benefits to gamers of using microtransactions in games. **[2]**

Answers may include:
- Allows players to customise their game / skin / characters without great expense.
- Provides greater enjoyment for the gamers /greater satisfaction.
- Allows gamers to advance in the game more quickly.
- Provides a competitive element for gamers.
- It is a quick process so gamers don't spend too much time in the transaction.
- It is easier (removing financial barriers).
- Removes financial barriers making the transaction easier.

Award [1] for identifying each benefit to the gamer of using micro transactions in games up to [2].

(ii) Identify **two** characteristics of a cryptocurrency. **[2]**

Answers may include:
- Secure / encrypted.
- Provides anonymity.
- Decentralised.
- Uses blockchain.
- Digital.
- Stored in a digital wallet.
- Intangible / not physical.
- Limited supply.
- Volatility.
- Does not require an intermediary / middleman such as a bank / not controlled by an authority.

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

(iii) Describe how encryption ensures the security of microtransactions. **[2]**

Answers may include:
- The information within the microtransaction is converted to a cipher code.
- This means it cannot be read if intercepted.
- But is converted back into a readable form for the intended recipient by the decryption key / only the authorised recipient can decrypt and access the transaction details.

Award [1] for each part of the description of how encryption ensures the security of the microtransaction up to [2].

(b) (i) Explain **one** reason why a parent or guardian may not realize a microtransaction has taken place. **[2]**

Answers may include:
- Usually the amount paid out from the account is small / small financial transaction
- so the payment does not trigger a warning from a bank / may not notice the transaction taking place.

- They may be unlikely to notice a small transaction
- ... as they need to wait until the end of the month for a statement (which they may not always read)

- Two-factor authentication / purchase notifications are not enabled
- which means that the transaction goes unnoticed.

- The payment method (credit card) might be saved on the device
- so children can make purchases without permission.

*Award **[1]** for a reason why a parent may not realise why a microtransaction has taken place and **[1]** for a development up to **[2]**.*

(ii) Explain **two** ways in which parents or guardians can manage their children's in-game spending. **[4]**

Answers may include:
- Some games may allow for setting an upper limit.
- Which mean that once this level is reached no further transactions can take place.

- Set up an alert on the credit card.
- So every time a transaction takes place the parent is alerted.

- Use a gift card / disposable debit card for transactions.
- So that there is a limit to the spending.

- Do not link or store payments methods to the game.
- So a payment method is requested every time a transaction is initiated.

EITHER
- Set up computer / game so that a password (or other authentication technique) is required for every transaction / Enable parental controls.
- That require a verification code before any in-game purchase is completed.

OR
- So that parents are involved in monitoring every purchase / This code can be sent to the parent's or guardian's phone.
- Ensuring they approve each transaction.

Note: do not allow answers that simply refer to parents monitoring or supervising their child's gaming.

Award [1] for ways that parents can manage the in-game spending of their children and [1] for a development up to [2].

Mark as [2] + [2].

(c)   To what extent is it acceptable for gaming companies to use microtransactions in games aimed at children? **[8]**

Acceptable
- If the game is free to play, micro transactions could remove potentially offensive adverts, add features (systems, ethics, values).
- If a limit can be placed on the total of micro transactions allowable that is set by the parents it could teach children a life skill in managing money (values).
- If the game allows the right to be forgotten (ethics, values).
- If the microtransactions make the game is challenging/enjoyable (identity).
- If the microtransactions are optional, players are not forced to pay (systems, ethics, values).
- If companies provide a warning about microtransactions (ethics, values).
- If games require parents of underage children to consent before making microtransactions (ethics, values).
- If the game has an age restriction / rating which prevents younger children from playing (ethics, values).
- If the game complies with laws of the countries in which it is being played (ethics, values).
- If the game does not collect data about players under the age of 18 (ethics, values).

Not acceptable
- If microtransactions could lead to uncontrolled spending (ethics, values).
- If parents are not aware of the game environment (systems).
- if microtransactions encourage gambling behaviour (ethics, values).
- If children are lower than the legal age for gambling (ethics, values).
- If microtransactions could lead to on screen addiction by encouraging continued playing with a purchase (systems, ethics, values, change).
- If data could be shared that could impact future requests for credit if there is excessive spending (ethics, values).
- If the game required children to create a profile which allow the company to collect and store data their data (systems, ethics, values).
- If asking for payments creates a digital divide between gamers depending on their budgets (power).
- If gaming companies use personal data collected from users to encourage them to spend more (by targeted advertising) (power, systems, ethics, values).

Keywords: Change, power, systems, ethics, values, micro-transactions, crypto-currency, leisure, privacy, anonymity, transparency, trust, accountability, expression, identity.

Please see SL paper 1 part (c) and HL paper 1, Section A part (c) markband on page 18.

2. **Drones in agriculture**

(a) (i) Identify **three** sensors that might be included in a crop-spraying drone. **[3]**

Answers may include:
- Light / lidar.
- Infrared.
- Ultraviolet.
- Temperature / heat / cold.
- Camera.
- Distance / proximity / radar.
- Moisture / humidity /rain.
- Motion.
- Altitude / altimeter.

Note: do not award a mark for GPS sensor as this is in the question stem.

Award [1] for each sensor identified up to [3].

(ii) Identify **three** items of data a crop-spraying drone could send back to the farmer. **[3]**

Answers may include:
- position
- height / altitude
- GPS coordinates
- amount of spray left
- speed
- direction of travel
- pitch
- yaw
- battery status
- temperature
- images and video footage
- plant health status (signs of disease or dryness)
- alert when a pest is detected
- distance travelled
- wind speed / wind direction
- humidity level / moisture in the air / rain
- data about light readings
- detect motion of objects (e.g., animals, vehicles, people).

Award [1] for identifying each item of data the drone can send back to the operator up to [3].

(b)   (i)   Explain **two** advantages of using a drone controlled remotely by the farmer rather than a drone that is following a path pre-set by the farmer.   **[4]**

Answers may include:
- The pattern of crop growth / need for spraying may not fit a model/may have unforeseen variations/climate change may make pattern more unpredictable.
- Can address scenarios in the field as they arise.

- The farmer can make judgements on what s/he sees.
- Which may make the spraying of crops more efficient / cost effective.

- The map that has been used to chart the path of the drone may not be accurate (or some other reason that the drone might go off course).
- So may not take into account physical obstacles such as trees or electricity pylons / things may change over time (trees grow etc) / may prevent accidents / may prevent spraying errors.

- Avoid obstacles (such as animals or farm equipment in the field) more effectively.
- To avoid any harm to animals / property / the drone.

Award [1] for identifying an advantage of using a drone controlled remotely by the farmer and [1] for a development of that advantage up to [2].

Mark as [2] + [2].

(ii)   Explain **one** reason why open-source software would be used to control or program a crop-spraying drone.   **[2]**

Answers may include:
- Free to use.
- Which may reduce the costs of the drone.

- Transparent (users can see the source code).
- Which means bugs can be easily fixed/gives owner flexibility to change code.

- Can be distributed freely/could be shared with other farmers.
- Community based/people can work together on improvements to the code.

Award [1] for a reason why open source software would be used to control or program the drone and [1] for a development up to [2].

(c) Evaluate the opportunities **and** challenges for farmers using drones to spray their crops. **[8]**

Note: The question stem does not specify that 'spraying' refers to spraying with insecticide or other chemicals. Do not penalise candidates who talk about 'watering' plants.

Answers may include:
Opportunities
- Is a more effective use of time – faster than manually spraying (systems).
- The farmer may be able to carry out other tasks while the drone is carrying out the spraying (systems).
- The drone may be able to collect other data about the crop/field such as moisture content, the nature of the crop growth and monitor plant health (systems).
- Drones can more accurately target individual plants which means a reduction in over and under spraying of plants (that could have a positive environmental impact) (systems).
- Sensors can be used to assess the condition of individual plants and deliver exactly the right chemicals or nutrients to each plant (systems).
- Drones are particularly useful in areas where the terrain makes fields difficult to access (spaces, systems).
- Hard to reach areas could be sprayed/inspected without the farmer having to physically travel to the site (spaces, systems).
- This would be helpful during natural disasters such as floods (spaces, systems).
- Or if the farmer has land which is difficult to reach (spaces)
- It will mean that a larger area of land could be accessed than if the farmer had to operate the drone as the farmer would need to be able to see the areas he is flying to whereas a programmed drone could simply operate independently (systems).
- Farmers could use drones for tasks other than spraying such as livestock management (herding sheep etc.) (change, spaces, systems).
- Detecting animals that should not be in the fields and may cause harm to the farmers crops or animals. E.g. predators such as leopards or pests like rats or birds (systems).
- It is safer for the farmer who may have been exposed to health risks when manually spraying crops (values and ethics).
- Cost saving – once the drone has been purchased less cost on wages to workers who manually spray crops (values, ethics).
- Drones are much quieter than using an airplane, helicopter or tractor although they are not silent (systems).

Challenges
- The drone may only be as good as the algorithms / dataset used to program it (systems).
- The algorithms for path finding may be based on general principles rather than address the nuances of the field being sprayed (systems).
- There may be knowledge/judgement or intuition involved in determining the most effective spraying regime for the drone (systems, values).
- Increased mechanisation may lead to loss of skills as farmers do not need to manually spray and therefore don't learn to detect disease and pests themselves (systems, ethics, values).
- The cost of purchasing / maintaining the drone may be high (systems).
- The drone's sensors could be affected by weather conditions (such as rain) which could hinder the working of a drone more than it would a human (systems).
- Drone may malfunction and damage crops or injure animals and humans (systems).
- Farmers will need training in how to fly a drone. Some countries have regulations that require drone pilots to be registered. This means that outside operators may be needed (change, power, values).
- Drones could present issues of invasion of privacy if cameras capture unauthorised images (ethics, values).
- Drones could disturb other people or animals (e.g. via the noise they make or flying too close) (systems).

Keywords: *change, spaces, systems, ethics, values, algorithms, drones, GPS, software, open source, autonomous technologies, environment.*

Please see SL paper 1 part (c) and HL paper 1, Section A part (c) markband on page 18.

3. Deepfakes used for advertising

(a) (i) Identify **two** types of synthetic digital media. **[2]**

Answers may include:
- text
- image / photographs / picture / art
- audio
- animation
- video.

Award [1] for identifying each type of synthetic digital media up to [2].

(ii) Identify **two** characteristics of synthetic digital media. **[2]**

Answers may include:
- rapid sharing
- efficient storage
- interactive
- linear and non-linear content
- convergence (of media forms and layers)
- AI generated content
- aims to replicate human characteristics e.g. voice, appearance, behaviour / create virtual version of real or fictional people.

Award [1] for each characteristic of synthetic digital media up to [2]

(iii) Identify **two** reasons why a customer may want to customize their avatar. **[2]**

Answers may include:
- hide their identity
- change their appearance
- change the perception of their behaviour/ intention e.g. appear more friendly or professional or trustworthy
- represent their image on a public platform / personalise their experience in a game by including an avatar that represents them / to reflect their personal style, hobbies, interests and/or beliefs
- to embody an identity they admire, such as a favorite celebrity or public figure.

Award [1] for each reason why a customer may want to customise their avatar up to [2].

(b) (i) Explain **one** reason why developers need to avoid the uncanny valley. **[2]**

Answers may include:
- The humanoid may create confusion.
- As it might not be obvious whether to treat it as a human or a robot.

- The humanoid may create negative feelings.
- This can lead to mistrust of the developers or the message they are communicating.

Award [1] for a reason why developers need to avoid the uncanny valley and [1] for a development up to [2].

(ii) Explain **one** advantage of using a social media influencer to promote a product. **[2]**

Answers may include:
- Improve brand awareness.
- Through the dissemination of information in social media forums.

- Influencers may have large numbers of dedicated followers.
- Who may be likely to purchase the product.

Award [1] for identifying an advantage of using a social media influencer for the promotion of a product and [1] for a development up to [2].

(ii) Explain **one** disadvantage of using a social media influencer to promote a product. **[2]**

Answers may include:
- The influencer may not have expertise in the product.
- So the recommendations may lack authenticity and could have negative effects / could lead to misinformation.

- The influencer may not approve the product / is looking for easy money.
- So the promotion of the product may have little value.

- Popular influencers may charge high fees.
- So the marketing campaign could become very expensive.

- Social media personalities may not be liked by all.
- Which could cause the product to become less popular with certain groups.

Award [1] for identifying a disadvantage of using a social media influencer for the promotion of a product and [1] for a development up to [2].

(c)   To what extent is it acceptable for a company to use synthetic digital media, such as AI-generated media and deepfakes, to promote products?   **[8]**

Answers may include:
Is acceptable
- Where the organisation has made it clear that the advert has used synthetic digital media (ethics, values).
- If the person being used as a deepfake (if this is a deepfake of a real person) has given their consent to be used (ethics, values).
- Where the product is not something which might harm people if used incorrectly (e.g. medication) or is not political in nature (e.g. trying to change opinion on an issue or topic) (ethics, values).
- If synthetic media is used responsibly (ethics, values).
- Where synthetic media is a cheaper and easier alternative to traditional media (systems).

Is not acceptable
- If the person being used as a deepfake (if this is a deepfake of a real person) has NOT given their permission - may lead to the person being deep faked being misrepresented and destroy their reputation (ethics, values, expression, identity).
- if the relationship of the person (who is used as a deep fake) to the customers is used unethically - e.g. a famous actor promoting a skin care product or a figure which appears to be a doctor giving medication advice (power, space, ethics, values).
- If the deep fake is spreading misinformation this could negatively influence the customers resulting in loss of money (ethics, values).
- If the company does not disclose that synthetic media has been used in the production of the advertisement (ethics, values).
- If artists, producers and writers will lose their jobs because of using synthetic digital media (change).
- If it makes people feel uncomfortable (e.g. uncanny valley) (systems, values).

Keywords: *change, power, systems, ethics, values, media, synthetic, media types, social media, influencer, uncanny valley, leisure, business, employment.*

Please see SL paper 1 part (c) and HL paper 1, Section A part (c) markband on page 18.

4. Undersea cables and the digital divide

(a) (i) Identify **two** devices that enable users to access the internet. **[2]**

Answers may include:
- Smartphone / mobile phone / cell phone (NOT just 'phone').
- Laptop / Desktop / Tablet / computer /smart TV.
- Router / Modem.
- Proxy server.

Award [1] for each reason device that enables users to access the internet up to [2].

(ii) Identify **two** services accessible via the internet. **[2]**

Answers may include:
- email
- chat / texting / online messaging
- world wide web (accessing websites and information) / hosting – award a mark for an example or description of a web service such as social media, ecommerce, search engine, sharing documents on web platforms
- VoIP / video conferencing
- IPTV
- streaming services
- file sharing.

Award [1] for identifying each service accessible via the Internet up to [2].

(iii) Identify **two** characteristics of cloud computing. **[2]**

Answers may include:
- data is stored on remote server rather than a local device
- data is processed on a remote server rather than a local device
- distributed systems
- can be accessed from any location / device on demand storage and services
- automatic backup of data
- analysis will occur when there is a comparison with another point.
- security is provided by the remote company
- equipment and maintenance of the equipment is provided by remote company.
- allows collaboration through shared documents and services.

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

(b)   (i)   Explain **one** environmental impact of cloud computing.   **[2]**

Answers may include:
- Energy use (mostly for cooling servers but also to run equipment and building).
- Which can involve environmental damage depending on how the energy is generated e.g. carbon emissions from burning fossil fuels.

- Generate heat due to electrical parts.
- Which can contribute to environmental warming / which then requires cooling which uses energy.

- Water used in cooling.
- Could be a problem in water scarce areas.

- Massive use of electronics.
- Which are difficult to recycle.

- Impact on natural environment / plant, animal or marine habitats.
- Of cables running to and from data centers / large buildings / undersea cables.

Award [1] for identifying an environmental impact of cloud computing and [1] for a development of that impact up to [2].

(ii)   Explain **two** ways in which the data centres that contain the hardware and infrastructure for cloud computing can minimize their harm to the environment by using green computing principles.   **[4]**

Answers may include:
- Data centres are located in cold climates / near bodies of water.
- So there is less need for cooling.

- Data centres use renewable energy/use solar energy.
- So there is less production of greenhouse gases / less use of fossil fuel energy.

- Data centres use recycling and e-waste management.
- So they can properly dispose of waste / reduce e-waste.

- Ensuring the use of energy efficient hardware.
- To reduce the energy requirements of using the equipment.

Award [1] for way the data centres that provide the facilities for cloud computing can adhere to green computing principles and [1] for a development up to [2].

Mark as [2] + [2].

(c) Discuss whether it is the responsibility of cloud computing providers or individual governments to ensure all countries have equal access to the internet **[8]**

Answers may include:

Internet businesses
- It is the duty of the internet businesses to assist the people within their countries to have access to the internet (net neutrality could come into this) (ethics, values).
- Failure to provide equal internet access could lead to an exacerbation of differences between the 'haves' and 'have nots' / increase the digital divide between countries (power, ethics, values).
- It is in the interest of cloud computing providers to ensure the maximum number of customers have access to the internet (systems, spaces).
- Governments do not necessarily have the experts to ensure the internet backbone (such as undersea cables) which is more a commercial undertaking (change).
- Governments (especially in small countries) might not have the financial means to install expensive equipment like internet cables but large internet companies could fund these cables through various countries (change, systems).
- Internet providers may be required to monitor and report users who access material which the government deems inappropriate or wishes to censor. This limits their ability to provide equal access (systems, ethics, values).
- As Internet businesses (such as Amazon, Google and Microsoft) are global countries, it could be argued that it is their responsibility to ensure the connections exist between countries (values).

Governments
- The internet is considered to be a human right (ethics, values).
- Providing access may come with 'strings attached' which may lead to a dependence in the recipient country on a provider (power, ethics, values).
- Independent companies do not have a responsibility for access in a whole country or region, this should rather be undertaken by a government (power, spaces, ethics, values).
- Governments have a responsibility to ensure that their countries are economically stable so that internet businesses can operate within those countries (spaces, ethics, values).
- Some governments may wish to restrict access to the Internet as a means of control / censorship. This would both require them to have control over the country's internet access and be able to limit the access of their citizens (spaces, ethics, values).
- In LEDCs, the government will need to ensure that the infrastructure is in place to allow citizens to access internet services and allow ISPs to operate.

Conclusion
- Providing access to the internet for everyone has to be a joint approach between the cloud computing providers and the government.
- While the government can express the desire for all citizens to have equal access to the internet, they are unlikely/unable to provide the infrastructure to make this possible, which means a form of partnership.
- The cloud computing providers are under no obligation, although you could argue there is a moral one, to ensure all citizens have access to the internet, this is not part of their business model.
- The government may need to incentivise cloud computing providers to provide internet access to every citizen (values).

Keywords: *digital divide, change, power, spaces, systems, ethics, values, networks, internet, internet services, ISP, cloud, cloud computing, equity, environment, regulation, laws*

Please see SL paper 1 part (c) and HL paper 1, Section A part (c) markband on page 18.

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The following markband 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.