# AQA Computer Science A-Level 4.8 Consequences of uses of computing Past Paper Mark Schemes

# Additional Specimen AS Paper 2

Level	Description	Mark Range
3	A line of reasoning has been followed to produce a coherent, relevant and substantiated and logically structured response. The response covers ethical, legal and cultural issues. In these areas there is sufficient detail to show that the student has a good level of understanding of the issues involved. A good level of understanding would be indicated by two or three substantiated points being made per	7-9
2	area.  A line of reasoning has been followed to produce a mostly coherent, relevant, substantiated and logically structured response that covers at least two of ethical, legal and cultural issues. In each of these areas, at least two valid points must have been made.	4-6
1	A few relevant points have been made but there is no evidence that a line of reasoning has been followed.	1-3
company may be us Ethical:	g the safety of students using has a responsibility to decide ed	how the collected da

### parents

- need to consider what harmful purposes users might use the service for
- need to consider what security measures the developers should use for the service
- need to consider what data should be collected about each student during registration
- should the company monitor the messages being posted by students?
- should the company develop a system for alerting somebody / blocking users if inappropriate material is posted?
- should the company use the data to target adverts // sell the user data on to marketing companies?
- what steps should the company take to ensure that the system is not hacked // data lost / damaged?
- how to deal with copyrighted material that a student might post as part of a discussion

## Legal:

- need to comply with legislation
- worldwide service so need to consider different legal systems
- where to base the service may be influenced by laws in that country
- may be conflicts between how users expect company to deal with data / monitor student messages and legal requirements
- data protection legislation will (probably) apply
- copyright legislation may be breached if copyright material uploaded / attached to a message

### Cultural:

- discussion of science topics that go against a culture's beliefs
- risk of pushing developer's values on to other cultures

09	Marksa	re all AO2 (analysis)		
	Levels			9
	Level	Description	Mark Range	
	3	A line of reasoning has been followed to produce a coherent, relevant, substantiated and logically structured response. The response covers at least three areas indicated in the guidance below and in at least three of these areas there is sufficient detail to show that the student has a good level of understanding of the issues involved. A good level of understanding would be indicated by two or three substantiated points being made per area.	7-9	
	2	A line of reasoning has been followed to produce a mostly coherent, relevant, substantiated and logically structured response that covers at least two of the areas in the guidance. In each of these areas, at least two valid points must have been made.	4-6	
	1	A few relevant points have been made but there is no evidence that a line of reasoning has been followed. The points may only relate to one of the areas of the guidance.	1-3	
	Guidan	ng issue:	1	
	• 0	Control over data access moves from users to to loud storage company Company has a responsibility to decide in a fair he data can be used		
	Ethical is	ssues:		
	• V a a • N • N s • V p	Who will own the data when it is stored on the so what rules should the company develop about cceptable use of its service? leed to have transparent policies to gain trust of leed to consider what harmful purposes users ervice for what security measures should the developers lace to protect files? (Accept examples, such a ncryption, two-factor authentication)	of users might use put in	

- Possible tension between security for individual users and security/safety of country / others
- If data is encrypted, should the company know the key to decrypt it or only the user?
- Should the company offer "backdoor" access to security services?
- If company shown to cooperate too much with security services, may lose trust of users / not be commercially viable
- Should the company analyse data stored itself so that it can alert law enforcement agencies if it suspects illegal behaviour?
- Should employees of the company be able to access users files?
- Could the company exploit the data that is stored itself eg analyse files stored to target adverts at users?
- Should other data be gathered by the company, eg who is accessing what files?
- What steps should company take to ensure that user data is not lost / damaged?
- How to deal with copyright material / intellectual property that is uploaded to service?

# Legal issues:

- Need to comply with legislation
- Worldwide service so need to deal with different laws in different countries
- Where to base service may be influenced by laws that apply in country
- May be conflict between how users expect company to treat data and legal requirements
- May be obliged to comply with legal notices/rulings which company must keep secret // cannot notify users about
- Privacy / data protection legislation will (probably apply)
- Copyright legislation may be breached if copyright material uploaded

### Cultural issues:

- Different values associated with / interpretations placed on privacy in different cultures
- Risk of pushing western values onto other cultures

# January 2009 Comp 2

9	(a)	data which relate to a <u>living</u> individual who can be <u>identified</u> from that data // data about a <u>living identifiable</u> person;	1
	(b)	<ol> <li>password-protect files/database; R password only</li> <li>force regular changes of passwords;</li> <li>force strong passwords; or including an example</li> <li>firewall to guard against hackers;</li> <li>run anti-spyware software;</li> <li>backup regularly;</li> <li>keep backups securely stored away from computer system;</li> <li>ensure data can be restored from backups;</li> <li>only allow authorised software to be used on the system;</li> <li>staff training to make them data-aware;</li> <li>appropriate operational procedures;</li> <li>(set up work groups and) give access rights relevant to (groups') needs;</li> <li>Do not allow unencrypted data to be stored (on portable media)//encrypt data;</li> <li>run anti-virus software</li> <li>R Access rights on their own</li> </ol>	3

# January 2010 Comp 2

11	(a)	(i)	Copyright, Designs and Patents A Copyright	1
11	(a)	(ii)	Computer Misuse	1
11	(a)	(iii)	Health and Safety at Work A Health and Safety	1

1	1	(b)	(i)	Rules that an employee must follow//a member of an organisation is bound by; NE agreement R Laws alone instead of rules Usually a (written) document/contract; Contents of a code (may) not be legal requirement; Breaking rules could result in disciplinary action/possibility of losing job; MAX 2	2
1	1	(b)	(ii)	To set out points of good practice for employees//set out rules that are not legal requirements; To ensure employees are aware of legal requirements//as employees may not know what the law is; To relate legal requirements to the work that the employee does; To make clear consequences of breaking the rules if mark not already awarded in b(i)  A to exonerate the company if law is broken  MAX 2	2

# January 2011 Comp 2

11 a	Copyright Design and Patents Act (1988) // Copyright and Related Regulations (2003) // Digital Economy Act (2010);  NE Copyright, Copyright Act	1	
11 b	Encrypt the music file; A (decrypt) key is needed for playback; R code, PIN, password for key Download server keeps records of authorised clients (hardware devices) allowed to decrypt music; R tied to IP address Playback tied to a particular (set of) hardware device(s); A Using a digital watermark in the music file a form of steganography; R cannot be transferred to other devices NE "player" for "device"	MAX 2	

# January 2012 Comp 2

7	b		Clients may have broken Copyright, Designs and Patents Act; Digital Economy Act;  R Copyright, Copyright Act	MAX 1	
7	С		Data which relate to a <u>living</u> individual who can be <u>identified</u> from that data // data about a <u>living</u> <u>identifiable</u> person;	1	
7	d	i	ISP has (potentially) broken Data Protection Act (by not securing personal data);	1	
7	d	ii	(Clients have potentially misused/hacked their ISP's computer system) therefore clients have broken the Computer Misuse Act;  R they may have broken the law	1	

# January 2013 Comp 2

8	a	Copyright, Designs and Patents (Act);  A. Digital Economy Act	1
8	b	No money goes to the artists / publishers / distributors; The quantity/amount of music being produced could go down; (Pirated) music can be of a lower quality;	MAX 2

# <u>June 2011 Comp 2</u>

9	b	i	Not covered as not about individuals/people;  A not personal data	
			NE is not personal information  A data about a product	1
9	b	ii	Covered as could be used to identify <u>living</u> <u>individuals</u> ; <b>A</b> is personal data <b>NE</b> is personal information	1
9	С	i	Data should be accurate/up to date; Data should be kept no longer than necessary (for purpose); A responses expressed as "data has not been"	MAX 1
9	С	ii	Data should be kept securely; A responses expressed as "data has not been"	1
9	d		Regulation of Investigatory Powers (Act) R RIPA NE Investigatory Powers Act	1

# June 2012 Comp 2

9	а	Legislation Health and Safety (Regulations); Display Screen Equipment Regulations;	
		Affect Monitors should be moveable/adjustable to alter height/ reduce glare / minimize flicker;	
		A top of screen at eye level	
		Chairs should be moveable/adjustable; Position of mouse/keyboard assessed // keyboard should be separate from screen; Consideration of lighting; Space under desk for legs; Supply a foot-rest / wrist-supports;	
		A feet should be touching flat surface	
		Set up software to use readable fonts // select colours that are easy on the eye; Cables should not be left loose; Sufficient workspace around computer;	
		MAX 1 mark for legislation MAX 2 for affect	3

9	b	i	Copyright, Designs and Patents (Act);  R – Copyright	1
9	b	ii	Number of licenses the library has; If the software needs a license; Type of license the library has; Library has a site-wide license; Check that software can (legally) be used on more than one machine; A its terms of use	MAX 1

# <u>June 2013 Comp 2</u>

7	(a)	Data Protection (Act);	1
7	(b)	Data should be kept securely;	1
7	(c)	Data should be fairly and lawfully processed; Data should be obtained for specified and lawful purposes. (A. Data should be processed for limited purposes); Data should be adequate, relevant and not excessive; Data should be accurate // kept up to date; Data should not be kept longer than necessary; Data should be not transferred to other countries without adequate protection; Data should be processed in accordance with the rights of the data subjects.	MAX 1

# June 2017 AS Paper 2

Level	Description	Mark
3	A line of reasoning has been followed to produce a coherent, relevant, substantiated and logically structured response. The response covers ethical, legal and cultural issues. In these areas, there is sufficient detail to show that the student has a thorough level of understanding of the issues involved. Although understanding would be indicated by two or three points being made in each of the areas, although potentially thorough coverage of two areas might exceptionally lead to a mark in this band.	7-9
2	A line of reasoning has been followed to produce a mostly coherent, relevant, substantiated and logically structured response that covers at least two of ethical, legal and cultural issues. In at least one of these areas, at least two valid points must have been made that demonstrates a good understanding, and typically students should have made at least two points in two areas.	4-6
1	A few relevant points have been made and there is limited evidence that a line of reasoning has been followed.	1-3
Ethical - Consider of the consideration of the con	der if material in images could be of harm to children ying and requesting permission from any members of public caught	ing as

### Legal:

- Does Google need permission to film in what might be a private building.
- It may not be legal to film people without permission (on private land).
- Aspects of data protection legislation might apply.
- Copyrighted information might be inadvertently captured and may lead to legislation breach.
- Consider if material in images is legally allowed to be viewed by children.
- Could be a risk of identifying items to steal leading to liability for crimes being carried out
- Ability to identify locations and access could be used for crime or to carry out acts of terrorism.
- Street View is a worldwide service so would need to consider different legal systems.
- Consideration to the security of information storage needs to be made.
- Laws for certain buildings or areas of buildings may be more restrictive than others.

### Cultural:

- Some images of people or exhibits may be offensive to certain cultures.
- Taking images inside religious buildings for some purposes may be considered inappropriate.
- Some cultural beliefs may not allow photography of people.
- Do people have the right to request the deletion of their images?
- Could the culture of visiting places such as museums (e.g. family/school day trips) be affected by access them online?
- Need for balance between cultural sensitivities and freedom of expression.

NE. Without suitable context: Faces need to be blurred out, must comply with laws, invasion of privacy.

R. Reference to private homes, implication that will be used for live monitoring.

# June 2017 Paper 2

Level	Description	Mark
4	A line of reasoning has been followed to produce a coherent, relevant, substantiated and logically structured response. The response covers all four areas indicated in the guidance below and in at least three of these areas there is sufficient detail to show that the student has an excellent level of understanding of the issues and technologies involved. To reach the top of this mark range, an excellent level of understanding must be shown of all four areas.	10-12
3	A line of reasoning has been followed to produce a coherent, relevant, substantiated and logically structured response but the response may only cover two or three of the areas indicated in the guidance below. A good understanding is shown of each of these areas and if only two areas are covered, the coverage of these is excellent.	7-9
2	A limited attempt has been made to follow a line of reasoning by covering at least two of the topic areas in the guidance below.  Overall, at least four valid points must have been made which can relate to any of the topic areas in the guidance.	4-6
1	A few relevant points have been made but there is no evidence that a line of reasoning has been followed. The points may only relate to one or two of the four areas from the guidance or may be made in a superficial way with little substantiation.	1-3

### Guidance - Indicative Response

### 1. How it was possible for data to be collected

WiFi signals can travel outside of property // over wide area // limited control over range Any WiFi receiver in range can read the data packets **NE**. The receiver in the car can read the packets

No need to physically "tap" into a WiFi connection, unlike a cabled connection

A protocol that does not encrypt the transmissions may have been used // unencrypted data sent. **NE.** Network not secure

## 2. Steps to prevent

Use a protocol that encrypts data transmissions

A. Encrypt the transmission

R. Password protection

Example of secure protocol eg WPA, WPA2

Disable broadcast of SSID to make network harder to identify (Note: Accept this point even though the SSID would be in other data packets)

Limit power of transmitter so data does not travel outside premises (although in practice this might be hard to achieve)

Use cabled network instead of WiFi.

R. MAC address filtering (as cars were not connecting to networks just intercepting transmissions)

### 3. Legal and ethical issues

If the data is being transmitted through the air, who does it belong to, if anyone? // Should data transmitted by WiFi be treated like a broadcast (eg TV) or a private communication (eg telephone call)?

Is it wrong to intercept data if people freely choose to transmit it wirelessly? A. Is it ethical to collect data from people without their permission?

Is it legal to intercept data if people freely choose to transmit it wirelessly? What laws apply in this scenario? Is this really hacking?

Are the ethics or laws different for intercepting data transmitted wirelessly than by cable?

Is there a difference between collecting statistical data eg channel number, signal strength, SSID and collecting the payload data?

Was the data just collected or was there an intention to process it as well?

What should the company have done when it realised that the data had been collected? // Should the data have been immediately deleted, or kept so that the company could contact and apologise to people it had collected data from? // What should be done with the data now?

What should the company have done if it inadvertently discovered evidence of illegal activity in the collected data?

Legality/ethicality may depend on the nature of the data gathered // (In the UK) would some of the collected data count as "personal data" (under the Data Protection Act) // could some of the data have been sensitive (accept example eg bank account details, details of minors) NE. Data may be private

To what extent is the company financially liable for collecting the data? Or any consequences of its use?

Could the legal situation be different in different countries where the company operated?

Was the collection of data intentional or just an accidental side-effect of a reasonable process?

What was done to ensure (existing) policies are followed?

Should there have been more oversight of code development?

Could intellectual property have been inadvertently stolen?

Is it ethical to collect/store information secretly from people // without them knowing?

Is it ethical to collect data if there is no (legitimate) purpose for doing so?

Were the developers in breach of their contracts with the company / company guidelines?

### Relevant Legislation

Students may name specific pieces of legislation that could have been breached as part of their response. Determining whether or not a breach has actually occurred would probably require more information than is provided in the question and detailed knowledge of the legislation, which is not required by the specification. Therefore, up to **two points** can be given for students naming relevant pieces of legislation that could have been breached, regardless of whether or not this can be ascertained with certainty. Relevant pieces of legislation include:

- The Data Protection Act
- The Computer Misuse Act
- The Regulation of Investigatory Powers Act
- The Communications Act

Points should be given for assertions that legislation has definitely been breached, even if this is only a possibility in the context rather than a certainty.

Responses that reference other legislation should be referred to Team Leaders.

A. As an alternative to naming the Data Protection Act, a response could instead question whether privacy laws have been breached, or if a breach of privacy has occurred.

### 4. Lessons

Improved training for developers in what is legal / ethical (accept company needs to improve understanding of legal/ethical issues)

Need to review guidelines that developers are expected to follow

Need for scrutiny of code / supervision by people outside of development team

Developers could be required to check each other's code

Developers could be required to log changes made to code and reason

Should only collect data that is absolutely necessary // that has a clear purpose // need to review collected data to see why it is being collected and stored // need to fully consider the purpose of any data collection before doing it

Could/should remove equipment for Wi-Fi data capture used in cars to collect mapping data.

**NE.** Further testing should be carried out unless there is a clear explanation of the mechanism by which testing will check that the software has no additional functionality is described eg inspection of collected data files to verify purpose of contents

# <u>June 2009 Comp 2</u>

8	(a)	Data that relate to a <u>living</u> person//individual who can be <u>identified</u> from that data;  NE Data that belongs to/relates to a person	1
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Principle	Appropriate Feature
Data must be accurate and up to date.  A accurate without up to date or vice-versa (A correct for accurate)  Data must not be kept for longer than is necessary.	Validation/examples of a validation method; Verification/example of a verification method; Store date when data last updated; Alert user when data is older than specified age; Records deleted automatically after no contact with customer for fixed period; Option to delete data;
Data must be processed in line with the rights of data subjects.	Option to flag customer as not accepting direct marketing; Option to edit or delete data; Option to print copy of all data for customer to see;
Data must be kept securely // Prevent unauthorised access/disclosure of data NE Hacking	Password/card/biometric to logon; Encryption; Backup; Different types of user/users have different rights; Automatic logoff if left unattended; Other appropriate security method;
Data must only be processed for registered/lawful purpose	Input of data subject preference with regard to use of/transfer of data; Restrictions on exporting data from package;
A Data must not be transferred to other countries without adequate protection.	Restrictions on exporting data from package;
1 mark for principle 1 mark for naming feature that is stated 1 mark for appropriate explanation the company comply with the DPAR Other DPA principles MARK CAN BE AWARDED FOR STATED OR IF FEATURE INA	on of how the feature will help OR PRINCIPLE IF NO FEATUR