Diploma Programme
Programme du diplôme
Programa del Diploma

International Baccalaureate
Baccalauréat International
Bachillerato Internacional

# Markscheme

# May 2017
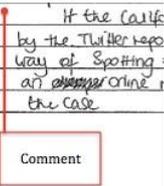
# Information technology in a global society

# Higher level

# Paper 3

International Baccalaureate®
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The following are the annotations available to use when marking responses.

| Annotation | Explanation | Comment | Short cut |
|---|---|---|---|
| ✔ | Correct point | Use for identify, state, outline, describe | Alt+0 |
| ✖ | Incorrect point | Use for identify, state, outline, describe | |
| BOD | Benefit of the doubt | Answer is close enough to give some credit, indicates that you see some merit in it. | |
| NBOD | No benefit of doubt | Not quite enough to earn any credit. | |
| SEEN | Seen | Indicates that the text has been noted, but no credit has been given, or used on a blank page to ensure that RM Assessor and/or staff in Cardiff know that you have seen the page | |
| OC | Off course | | Alt+8 |
| TV | Too vague | Point is unclear, or not specific enough to answer the question. | Alt+1 |
| REP | Repetition | Repeats a point previously made, not necessarily worded in the same way. | Alt+2 |
| REF | Reference | This is used to indicate a reference to the stimulus material, article or the Case Study (Paper 2 or Paper 3) | Alt+3 |
| D | Description | Candidate has added descriptive information to an initial idea that has been named or identified. | Alt+4 |
| A+ | Analysis / Explanation | Candidate has explained **why** something occurs, or why it is important to the point s/he is making, or described the consequences of a policy/action/use of IT. | Alt+5 |
| B+ | Balanced argument involving detailed analysis | Use in the examiner's comments at the end of extended response questions. Balanced arguments involving detailed analysis can occur within paragraphs as well as at the end of the response. Often, a transition word to link/compare ideas, such as "however" or "on the other hand" is used. Can also be structured analysis of ideas, e.g. good vs bad, for X and against X. | Alt+6 |
| EVAL | Evaluation – beyond the ideas presented to reach a conclusion or overall comment. | Use only if **evaluation is supported**, not just stated. Note that evaluation can occur in the body of an extended response as an evaluative comment about an idea as well as at the end in the conclusion. Fully evaluated requires a well-supported conclusion. Evaluation and detailed analysis can overlap when evaluation is within a paragraph. | Alt+7 |
| O | Opinion | Use only if opinion is supported, not just stated. Note that opinion can occur in the body of an extended response as well as at the end. | Alt+9 |

| | | | |
|---|---|---|---|
| ⬭ | Dynamic, Horizontal | Indicates a valid point that the student will need to support in an extended response. | |
| ∿ | Dynamic, Horizontal Wavy | Used for incorrect statements/phrase | |
| ⧉ | Dynamic, Vertical Wavy | Indicates that the candidate has veered off course, i.e. either by not answering the question that is asked or has moved in a direction unrelated to the question. Can also use OC annotation | |
| It the Calif by the Twitter repo Way of Spotting an abuser online the case / Comment | Text box with extended vertical line. | Used to mark and comment on a block of writing that makes a valid point. Note that the text box and the vertical line are connected. | |
| Text box | Insert comments | Used for comments at the end of questions where the mark needs to be JUSTIFIED. Often with AO2 command terms – EXPLAIN. ALWAYS with AO3 command terms – EVALUATE, JUSTIFY, TO WHAT EXTENT, and DISCUSS. | |

You **must** make sure you have looked at all pages. Please put the **SEEN** annotation on any blank page, to indicate that you have seen it.

**Critical Thinking – explanation, analysis and evaluation**

These trigger words often signal critical thinking. The bold words are the key terms in the various criteria.
**Explanation** - *Because, as a result of, due to, therefore, consequently, for example*
**Analysis** - *Furthermore, additionally, however, but, conversely, likewise, in addition, on the other hand, whereas*
**Evaluation** - *My opinion, overall, although, despite, on balance, weighing up*

Examiners should be aware that in some cases, candidates may take a different approach, which if appropriate should be rewarded.  If in doubt, check with your Team Leader.

If candidates answer more than the prescribed number of questions:

- In the case of an "identify" question read all answers and mark positively up to the maximum marks.  Disregard incorrect answers.

- In the case of a "describe" question, which asks for a certain number of facts *eg* "describe two kinds", mark the **first two** correct answers.  This could include two descriptions, one description and one identification, or two identifications.

- In the case of an "explain" question, which asks for a specified number of explanations *eg* "explain two reasons", mark the **first two** correct answers.  This could include two full explanations, one explanation, one partial explanation *etc*.

**1.**  (a)  Insurance companies will use data gathered by the *KHT* watch when deciding on the price of an insurance policy.

Identify **two** items of data that could be collected by the *KHT* watch.                    **[2]**

*Answers may include:*
- time spent exercising
- max heart rate achieved/resting heart rate
- heart rate/heart beat/pulse
- calories used during exercise
- nature of exercise such as gentle, fat burning
- age, gender, weight, height
- number of steps
- amount of activity (if rewarded, then do not give a further mark for detail of activities, *ie* different level of activity) – not just "activity" on its own
- sleep patterns
- percentage of recommended daily activity.

Do not accept features that the *KHT* watch does not yet measure, *eg* glucose.

*Award [1] for each item of data collected by the KHT watch that would be useful for an insurance company when deciding on the price and conditions of an insurance policy up to a maximum of [2].*

(b)  Outline **one** reason for using XML to format the data produced by the wearable devices.                    **[2]**

*Answers may include:*
- Basic answer:
  - easier to manipulate than other formats
  - common standard
  - different computers can understand it easier
  - cross platform in nature (compatibility)
  - it is readable by both humans and machines
  - easier to synchronise data to different websites
  - can hold many different type of data
- Development of the basic answer:
  - XML provides a common syntax for messaging systems for the exchange of information between applications
  - XML information can be manipulated programmatically (under machine control), so XML documents can be pieced together from disparate sources, or taken apart and re-used in different ways
  - XML lets you separate form (appearance) from content. Your XML file contains your document information (text, data) and identifies its structure: your formatting and other processing needs are identified separately in a stylesheet or processing system
  - XML provides a robust and durable format for information storage and transmission. Robust because it is based on a proven standard, and can thus be tested and verified; durable (persistent) because it uses plain-text file formats which will outlast proprietary binary ones
  - XML allows sets of documents which are all the same type to be created and handled consistently and without structural errors, because it provides a standardised way of describing, controlling, or allowing/disallowing particular types of document structure.

**NB:** Marks are not awarded for a definition of XML.

*Award **[1]** for a general reason related to the use of XML as a format for the data.*
*Award **[2]** for a technical development of the reason related to the use of XML as a format for the data.*

*The following resource may be used for further investigation of the topic.*

http://xml.silmaril.ie/whyxml.html

**2.** A group of students who own *KHT* watches decided to compare their watches. Although they completed the same activities they found information, such as the number of steps walked, differed between the watches.

Explain **three** reasons why these differences may occur. **[6]**

*Answers may include:*
- malfunction/broken (as long as detail is given, such as the type of malfunction or when it occurred)
- lack of accuracy of GPS tracking
- different results could be obtained depending where the device is worn on the body (*eg* arm, hand, inside a pocket)
- slight variation in the route taken
- slightly different level of effort during the exercise (this would affect the total calories calculation for example)
- physical differences (weight, height, *etc*)
- sensitivity of sensors: different calibration, different power required to activate the software to count the steps
- type of walking – flat, hilly, steps that may not be taken into account by the software in the wearable tech
- stride measurement not taken into account or assumed to be a particular value which may be different to that if the user is very tall or the watch may not be calibrated, *etc*
- light sensors interacting with the body for heart rate, glucose, *etc* may be affected by the skin colour, hairs, tattoos, *etc* in different ways
- watches are different versions/models of *KHT* watch
- difference in time of the watches (*ie* if one was set to a different time zone and the other was not, this might affect the totals for that day).

**NB:** The question is referring to the data stored on the watch and not the data synced to the phone.

*Award **[1]** for identifying why information such as the number of steps walked, differed between the watches. And **[1]** for development of that point to explain the difference up to a maximum of **[2]**.*

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

**3.** *KHT* has received requests from some customers to include features that they can use to help them manage their own health and well-being (lines 96–99, 103–105).

Discuss whether *KHT* should develop its wearable technologies so that customers can use them to help manage their own health and well-being. **[8]**

*Answers may include a range of reasons from either one or both of the two possible perspectives. Entry to the top markbands will depend on how well the reasons are used to justify a conclusion/judgement.*

*Reasons why KHT should develop its wearable technologies:*
- greater customer satisfaction with the product
- customers can use this to track and monitor specific data and trends from their daily life routine which can be used to manage their health
- makes the product more adaptable and able to be accurately set for customers with different needs, *eg* children, sports people, aged
- gives customers greater ownership of their healthcare program
- customers can set and reach goals that will benefit their health and wellbeing
- *KHT* could cater for niche markets as the setting can be adapted to the specifics of the user group, *eg* aged, sports, children
- *KHT* could obtain useful feedback about whether to further develop in niche markets such as elite athletes, elderly customers, children
- *KHT* could provide links with healthcare companies which may lead to them investing in *KHT*
- *KHT* could collect data that is specific to particular health and lifestyle issues which is more valuable than general data
- *KHT* may obtain a competitive advantage in this field.

*Reasons why KHT should not develop its wearable technologies:*
- it could require the development of new hardware for certain activities which could be an expensive/risky development
- it may include unnecessary features for most customers who just want a simple fitness device
- the algorithms used to develop the wearable technology may not apply to many customers (may be set at a general level)
- customers may not feel confident in understanding their own health requirements sufficiently to adapt the safe range of the wearable technology
- it could lead to litigation issues if customers have a heart attack or other heart problems due to setting unrealistic boundaries for their vital signs
- developing the new products may be very expensive and not recouped from sales
- *KHT* may not be able to ensure the privacy and security of the data which is collected
- consulting health and lifestyle experts (in developing the accompanying technology) would be expensive.

**HL paper 3 question 3 markband**

| Marks | Level descriptor |
|---|---|
| **No marks** | • A response with no knowledge or understanding of the relevant ITGS issues and concepts.<br><br>• A response that includes no appropriate ITGS terminology. |
| **Basic**<br>**1–2 marks** | • A response with minimal knowledge and understanding of the relevant ITGS issues and concepts.<br><br>• A response that includes minimal use of appropriate ITGS terminology.<br><br>• A response that has no evidence of judgments and/or conclusions.<br><br>• No reference is made to the scenario in the stimulus material in the response.<br><br>• The response may be no more than a list. |
| **Adequate**<br>**3–4 marks** | • A descriptive response with limited knowledge and/or understanding of the relevant ITGS issues and/or concepts.<br><br>• A response that includes limited use of appropriate ITGS terminology.<br><br>• A response that has evidence of conclusions and/or judgments that are no more than unsubstantiated statements. The analysis underpinning them may also be partial or unbalanced.<br><br>• Implicit references are made to the scenario in the stimulus material in the response. |
| **Competent**<br>**5–6 marks** | • A response with knowledge and understanding of the relevant ITGS issues and/or concepts.<br><br>• A response that uses ITGS terminology appropriately in places.<br><br>• A response that includes conclusions and/or judgments that have limited support and are underpinned by a balanced analysis.<br><br>• Explicit references to the scenario in the stimulus material are made at places in the response. |
| **Proficient**<br>**7–8 marks** | • A response with a detailed knowledge and understanding of the relevant ITGS issues and/or concepts.<br><br>• A response that uses ITGS terminology appropriately throughout.<br><br>• A response that includes conclusions and/or judgments that are well supported and underpinned by a balanced analysis.<br><br>• Explicit references are made appropriately to the scenario in the stimulus material throughout the response.<br><br>• There are explicit references to sites that the student has researched. |

**4.** *To reach the highest markband, the response to question 4 must include evidence of independent research linked to the KHT case study.*

The wearable technology developed by *KHT* enables the company to continuously gather data from its customers during their normal daily activities. Fajar and Adel have agreed to share this data with a number of healthcare organizations. This data could then be used to assist doctors in making recommendations to their patients (lines 20–21, 70–81, 111–121).

Discuss whether doctors should use this data when making recommendations to their patients. **[12]**

*Answers may include:*

**Reasons for using data from *KHT* products**
- the data provides additional data that may not be available from other sources such as providing information about an undiagnosed condition
- the data may be the only data that is available at the time of treatment as the patient may not have realized that they had the condition
- may provide the only source of continuous information that previously could only be collected by a patient being in a hospital
- there may be an expectation by managers in the healthcare organization that the data should be used as they see many possible benefits
- doctors may use *KHT* wearable tech to collect continuous data after the first examination to supplement the data they have collected
- use of *KHT* data may save money/time/effort required to gather the data for the health authorities as *KHT* will effectively be doing this for them by collecting customers'/patients' data.

**Reasons for not using data from *KHT* products**
- data may not be considered reliable enough to be used for medical purposes, this may be because of the quality of the sensors in the wearable tech
- doctors may be concerned about whether the data has been collected ethically
- doctors may be concerned that the data is collected as reliably as they could do in the hospital
- doctors may be dealing with aggregated data rather than that of the patient and this may lead to questions about whether it is appropriate and a benefit to use data based on many patients
- there would be an enormous amount of data available to doctors. There would be a cost to securely store this data and a significant time needed to analyse it.
- due to the volume of data a doctor may not have time to read/interpret all the information. Would he then be liable if he missed diagnosing a serious condition?
- there may be a directive by the managers of the Healthcare organizations that the data from *KHT* is not to be used for a number of reasons (*eg* possible legal issues)
- there may not be interoperability between *KHT* systems and those of the Healthcare organizations that allows for the real-time interchange of data
- there may be privacy concerns raised by the patient about the security and privacy of the data collected
- the healthcare organizations would need to develop policies and procedures for handling the data at some cost and possible inconvenience
- doctors could lose face to face time with patient´s when under observation.

**HL paper 3 question 4 markband**

| Marks | Level descriptor |
|---|---|
| **No marks** | • *A response with no knowledge or understanding of the relevant ITGS issues and concepts.*<br>• *A response that includes no appropriate ITGS terminology.* |
| **Basic**<br>**1–3 marks** | • *A response with minimal knowledge and understanding of the relevant ITGS issues and concepts.*<br>• *A response that includes minimal use of appropriate ITGS terminology.*<br>• *A response that has no evidence of judgments, conclusions or future strategies.*<br>• *No reference is made to the information in the case study or independent research in the response.*<br>• *The response may be no more than a list.* |
| **Adequate**<br>**4–6 marks** | • *A descriptive response with limited knowledge and/or understanding of the relevant ITGS issues and/or concepts.*<br>• *A response that includes limited use of appropriate ITGS terminology.*<br>• *A response that has evidence of conclusions, judgments or future strategies that are no more than unsubstantiated statements. The analysis underpinning them may also be partial or unbalanced.*<br>• *Implicit references are made to the information in the case study or independent research in the response.* |
| **Competent**<br>**7–9 marks** | • *A response with knowledge and understanding of the relevant ITGS issues and/or concepts.*<br>• *A response that uses ITGS terminology appropriately in places.*<br>• *A response that includes conclusions and/or judgments that have limited support and are underpinned by a balanced analysis.*<br>• *Explicit references to the information in the case study or independent research are made at places in the response.* |
| **Proficient**<br>**10–12 marks** | • *A response with a detailed knowledge and understanding of the relevant ITGS issues and/or concepts.*<br>• *A response that uses ITGS terminology appropriately throughout.*<br>• *A response that includes conclusions, judgments or future strategies that are well supported and underpinned by a balanced analysis.*<br>• *Explicit references are made appropriately to the information in the case study and independent research throughout the response.* |