

May 2016 subject reports

ITGS

Overall grade boundaries

Higher level

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 12	13 – 26	27 – 39	40 – 50	51 – 60	61 – 71	72 – 100

Standard level

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 11	12 – 23	24 – 34	35 – 46	47 – 57	58 – 69	70 – 100

Higher level and standard level internal assessment

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 4	5 – 8	9 – 11	12 – 15	16 – 18	19 – 22	23 – 30

General Comments

Several crucial themes emerge from the comments on each of the exam papers:

- In order to earn the higher marks, candidates need to demonstrate higher level thinking skills by incorporating analysis and subject specific information and terminology into the extended response questions. Bulleted lists cannot earn the highest marks because they do not allow for development of substantiated arguments required in Paper 1 part c and sometimes part b of the question, Paper 2 criteria C and D, paper 3 questions 3 and 4.
- Candidates should be able to incorporate examples and concepts they have learned in class into their answers. This means they need to keep a record of what is learned and discussed in class so they can study it before the exam.
- Candidates need to understand concepts rather than memorize facts. ITGS is a concept based course requiring the ability to transfer knowledge from known scenarios to the previously unseen ones in the examination papers.
- Candidates need continuous practice in writing skills, particularly the ability to develop ideas rather than just list them.
- Teachers need to participate in the special events on the OCC and use ITGSopedia as part of their professional development. The nature of information technologies is constantly changing. These changes have effects on the relationship between individuals and societies and the information technologies and information systems they use. This is reflected by the changes in nature of the HL Paper 3 Case Study.

The ITGS course is designed to provide students with the ability to make informed decisions about the development, implementation and use of both information technologies and information systems across a range of scales ranging from the individual user to the global community. In order for candidates to do this effectively in the externally assessed components, the teaching of these higher order thinking/critical thinking skills should be a central theme throughout the ITGS course.

Higher and standard level internal assessment (Project)

The range and suitability of the work submitted

ITGS Projects were submitted following the requirements in the Handbook of Procedures for 2015 Section B3.5. Updated requirements for 2016 were not available in the Handbook of Procedures for 2016. The zipped files were submitted as required using Forms.zip templates and were within the 750MB limit.

In most cases the zip file contained a *Teacher's Marks Justification* form. This was important in order for the moderator to understand how the teacher awarded marks and to provide appropriate feedback.

In some school samples there was an appropriate diversity in the type of products developed including problems for clients in a school environment, business or organization. In other cases, it was clear that the starting point was not the client and problem as required. The sample consisted of very similar products either all websites developed with the same features or all databases with a similar structure.

There were some instances where the clients were under the age of 18 years old. In these cases an adult co-client must be involved in the entire process from Criterion A through Criterion F.

The choice of the IT products was in almost all instances appropriate for the client's needs and the requirements for the ITGS Project. Websites made with online web development tools or online services tended to be more successful. There were also other IT solutions: videos, desktop published documents and databases.

The major shortcomings in the ITGS Projects were that a number of students:

- Did not understand the specific requirements of the various assessment criteria as they relate to their product.
- Did not conduct adequate research and investigations necessary for the design and development their product.
- Did not work closely with their client throughout all of the stages of development that is set out in Criterion A through Criterion F.

Specific concerns included:

- Even though projects used the forms.zip file, there were instances where students changed file names and the templates. This is not advisable as the template is setup to work with the original file names, changing the file names may lead to a loss of functionality of the links, which may affect one of the required elements in Criterion G.
- Documentation for some criteria was generic and lacked detail, especially Criterion B, Criterion C and Criterion D. Often references specific client, problem, IT solution, tools, techniques and resources were not indicated.
- Most projects were submitted in .zip or .rar format. .zip format is preferred because it is cross-platform and can be easily unzipped on both PC and Macintosh computers.

- Some screencasts were not submitted. Others were submitted in a format that is not cross-platform such as avi and wmv. Cross-platform formats such as mp4 or mov should be used.
- Students lost marks from simple omissions and errors such as the links on the cover_page.htm did not work or a link on the cover page did not open the specific product.
- Some types of products (e.g. videos, DTP documents, products made with applications not commonly available to the moderator) must be submitted in the original file format and in a cross-platform format to ensure that the moderator can access the product.
- Where products are websites and are only fully functional online or cannot be downloaded from online services, sufficient evidence from the making of the product must be provided in the Product folder. An empty product folder may not be submitted.
- Some diagrams and screenshots in Criterion D and Criterion E were not accompanied by sufficient explanation, not appropriately labelled or were too small and illegible.
- Some screencast had considerable background noise, were illegible or did not fully demonstrate that the product was fully functional. The techniques in Criterion E must be highlighted and it must be clear that the product contains sufficient content material.
- In instances where the word count exceeded 2000 words, only the documentation up to 2000 words could be awarded marks. No credit was given for the work beyond this point.

Candidate performance against each criterion

Criterion A: Initial investigation

The clients and their problems were largely appropriate for the Project. However, in most cases the consultation between the student and the client was not well planned.

Any ITGS Product which involves either the setup of a commercial product e.g. a school management system or involves a particular device e.g. RFID reader are not appropriate.

Major problems in Criterion A included:

- Candidates did not explain what approaches are currently being used/ have been used in the past and why they are not successful.
- It was not clearly understood what a 'cited reference' means. The interviewee, their position, and date must be clearly stated in Criterion A in the Consultation and Investigation.
- The questions were not carefully considered in the consultation and therefore, the investigation in Criterion A was superficial and the lacked depth required.
- In some cases it was not clear what the proposed IT solution should achieve.

Criterion B: Analysis

The information in the *Requirement Specification* section often lacked detail and was incomplete.

IT terminology used in the subtitles; system interaction, input, output, processing and security does not appear to be understood and lacked the necessary detail.

There were inconsistencies between the resources listed in this criterion and those listed in Criterion D.

The *Specific Performance Criteria* were often stated as phrases and/or were not appropriate nor well-considered. The *Specific Performance Criteria* are referred to in both Criterion D and specifically in Criterion F. They must be unambiguous, measurable and realistic.

The justification for the choice of the IT solution was often limited. Very few students considered how websites, desktop published products and videos would be publicized, distributed or accessed as part of their justification and how the product would address the requirements of the client. The feasibility of the development of the solution and its implementation must be considered.

Criterion C: Product schedule

Project Schedules tended to be a generic list of tasks that could have been written for any product of the same type (e.g. website, publication, video or database). The entries were often not specific to the client, the problem being addressed or applications and methods used.

All stages of development must be included for Criterion A through Criterion F: planning, designing, developing, testing and implementing.

It was obvious in some cases that the Project Schedule was not planned, but maintained as each criterion was completed.

Criterion D: Product design

Candidates must not only research the tools that they will be using, but also research how to design products using those tools. Accepted ways of presenting both the overall structure and internal structure of the specific product were not always used. Databases, websites, DTP products and videos – all have accepted ways for showing the overall structure and internal structure.

Additional research may be helpful to determine how problems of a similar nature have been addressed by an IT solution in the past.

Appropriate methods for showing the design of the particular product must be included including diagrams and sketches. They must have good quality and be legible. Some scanned images were too faint and some photographed images contained shadows.

Screenshots from the product are not acceptable in Criterion D because the design process is completed before development takes place.

The list of resources must include the source of all of the resources required to create the product both the content and online services. The list of techniques may include basic techniques and must include all of the appropriate techniques identified in Criterion E.

The depth of testing was quite variable. The tests carried out must directly relate to the Specific Performance Criteria in Criterion B and the overall functionality of the product. It may also include additional testing to effectively test techniques identified in Criterion E.

Often the signature of the client was missing to indicate agreement with the design of the product.

Criterion E Product Development

Few projects achieved the higher marks, i.e. accessing the 6-7 markband. This was primarily due to the choice of appropriate techniques and the overall structure of the actual product not being explained. Most projects described the techniques used in the development of the product (**how**), but did not explain **why** they were appropriate or the technique was chosen over other possibilities. This criterion is designed to assess the choices the candidate makes, and why they are appropriate for the product they are developing.

In many projects the sources were not cited in the explanation of the techniques.

Websites were the most common product. Where templates from online services are used as a starting point for the development of the website, they must be cited. Templated websites tend to include only basic techniques available through the provider. Candidates must give more consideration to the needs of the client and how to include appropriate techniques in their websites rather than opt for a quick and simplistic solution. (See *Guidance on the appropriateness of an information technology solution*)

The use of text boxes on screenshots is a way to point out how the tools were used. However, text boxes are not counted by word counting features in software. If the text within the text boxes provides descriptions or explanations, it will be considered as part of the overall word count. Please see additional guidance in the ITGS Teacher Support Material regarding word count.

Where code has been used as a technique, two screenshots are needed:

- A screenshot of the code with an explanation of what it does and why it is appropriate.
- A screenshot that shows the outcome/effects of the code.

Criterion F: Product evaluation and future product development

The feedback from the client should focus on questions about the process of developing the product as well as the Specific Performance Criteria. Feedback that consisted of responses to yes/no questions provides little useful information in Criterion F. In some instances, the candidate provided only the feedback from the client and did not include any evaluation from the candidate which is required. Criterion F received no marks in these instances.

Additional criteria that have emerged during the development process or from consultation with the client may also be considered as part of the evaluation.

Recommendations for the future development of the product may be included in the feedback from the client. More thought must be given to the future development of the product. Too often recommendations were made that should have been included in the current product or were superficial or unrealistic.

Similar to Criterion D, the signature from the client was missing in many cases.

Criterion G: Requirement elements

A few candidates did not submit screencasts. Although an audio commentary is not required, a silent screencast makes it difficult for the moderator to 'guess' what is actually being demonstrated. The size of the screencast must be limited to 5 minutes for maximum effectiveness. Moderators are not required to view for more than 5 minutes.

The most common issue in this criterion was not having any evidence in the product folder, except for a link to the product. An empty product folder should not be submitted as this implies that no techniques were used in developing the product.

Forms.zip must be used for the Project. File names, folder names and the actual templates may not be changed, instead the files need to be saved to doc (or docx) while the Project is being developed and to pdf for submission. If this is done the links on cover pages will work. Only the product needs to be linked to the cover page.

The links on the cover page must be tested before the product is submitted and that the product and all of the documentation is accessible and functions properly. It is advised that this be tested on several different computers.

Recommendations for the teaching of future candidates

Only refer to the most recent ITGS Guide (January 2016) and use the new assessment criteria. Also read Guidance on the appropriateness of an information technology solution.

Review the Project section in previous ITGS subject reports which are available on the Online Curriculum Centre (OCC). Please note that there were changes from May 2015 onwards in Criterion E and Criterion G.

Guide students more closely throughout the process of development which would include the following these steps for each criterion:

- The teacher explains the particular assessment criterion and the command terms used within the level descriptors.
- The teacher demonstrates the criterion by using exemplars from the TSM.
- The candidate conducts research and investigations as needed for the particular IT solution.
- The candidate develops the criterion and submits it for feedback from the ITGS teacher. The teacher can comment on only one draft of a criterion.
- The candidate makes the necessary edits/adjustments before proceeding to the next criterion.
- If changes are made in one criterion, they may have an impact on others. The candidate ensures that all of the necessary changes are made before progressing to the next criterion.

When the product is completed, the candidate proof-reads all the documentation, checks that the cover page and product function properly.

Further comments

Consult relevant information regarding the ITGS project:

- *ITGS Subject Reports* from the May 2012 session onwards, especially the most recent reports from May 2015 and November 2015
- *ITGS Guide* including the updated Criterion E and Criterion G
- *Teacher Support Material* which includes both information and 6 exemplars
- *Forms.zip* templates which must be used for the Project (link included in TSM)
- *Guidance on the appropriateness of an information technology solution* for the project
- *OCC ITGS Project FAQs*
- *IB Coordinator Notes* containing update notices for ITGS.

For professional development regarding the ITGS Project, please participate in:

- *OCC Discussion Forum* where questions and comments can be posted regarding the ITGS Project.
- *ITGS online workshops* (cat 1 & 2) or *ITGS face-to-face workshops* (cat 1 & 2, cat 3) where approaches to guiding the Project and specific Project samples are discussed.

Higher and standard level paper one

General comments

Higher level paper 1 and standard level paper 1 are separate components. However, many of the comments that apply to one component apply to the other.

In this session there were three questions that were common to both papers. They were as follows:

HL/SL Q1 - Public access to art museum databases

HL/SL Q2 - Online learning on your own device

HL/SL Q3 - Our interconnected world

The comments for these common questions are included within the HL Paper 1 comments on specific questions.

Higher level paper one

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 7	8 – 14	15 – 21	22 – 27	28 – 34	35 – 40	41 - 60

The areas of the programme and examination which appeared difficult for the candidates

A significant number of candidates did not read the question carefully, particularly parts b and c. The most important skill in reading an exam question is understanding what is required to clearly address the command term used in the question.

In question a, a few candidates are still writing fairly long answers for identify questions and therefore losing time that could be spent on extended response question. Candidates also struggle with writing clear definitions.

In part b of a question when the command term is “analyze” few candidates went beyond description to engage in analysis supported by reasoning and detail. Candidates had less trouble with explanations.

Part c of the question posed the most significant problems. Significant numbers of candidates are still writing lists, usually of advantages and disadvantages, sometime with some minimal

description, often in the form of bullet points. However, the command terms for question c should elicit developed arguments, not lists. To earn a 5 or above for these questions, candidates need to show evidence of critical thinking by providing arguments that are supported by reasoning, examples, and details. Very few candidates showed evidence of the ability to apply what was learned in class to new situations.

Some candidates are still trying to systematically the social/ethical issues in part c with disastrous results as they fail to analyze how a particular issue might impact the stakeholders.

Candidates often failed to identify the relevant stakeholders for part c questions. For example, in Question 2, a number of candidates focused on the impact of the BYOD scheme on students when the question clearly asked for the impact on the school. This led them to veer seriously off course.

Finally, there were significant problems in developing the implications of a particular impact. Too often it was just enough to state the impact and leave it at that.

Underlying all of these issues is a lack of conceptual understanding of the technology and its impacts. Memorizing definitions and other information is not enough. What is needed is understanding and knowledge that student can apply to new situations.

Most importantly, candidates did well when questions addressed technology they used in their own lives, but did poorly when understanding of concepts beyond their own experience was required.

The areas of the programme and examination in which candidates appeared well prepared

Being able to answer three questions instead of four gave a number of candidates the opportunity to think carefully and develop their ideas more thoroughly. Students need to be taught how to take advantage of this opportunity.

Most candidates were aware of the types of activities and tools that could be used in online education, the difference between home internet connections and hotspots, and the general characteristics of robots.

The strengths and weaknesses of the candidates in the treatment of individual questions

Section A:

Question 1 (Public access to art museum databases):

(a)(i) As the question asked for “types of field” suitable suggestions for data types (e.g. text, numeric, Boolean etc.) and/or data relevant to an art museum database (e.g. “name of artist”, “date of creation” etc.) were both accepted. Many candidates could answer this part correctly. Teachers should be aware that “alpha-numeric” is not a data type.

(a)(ii) Very few candidates had any knowledge or understanding of the specific characteristics of Creative Commons licensing. Some candidates were able to make suggestions related to the generic concept of “copyright” but these rarely attracted marks. Many responses claimed that Creative Commons licensing somehow restricted access to the licensed works or provided some sort of ‘security’. Candidates who had obviously studied Creative Commons licensing as a specific topic scored well on this question.

(b) Although many candidates could make plausible suggestions for implications of allowing public access to selected information in the museum’s database, far fewer addressed these implications to the specified stakeholder (a museum’s IT department). Some candidates suggested concerns that would clearly not be the responsibility of a museum’s IT department (e.g. ensuring the accuracy of the information in the database) or that the IT department would have no control over (e.g. checking that the information was used by the public in accordance with any licensing restrictions).

(c) Many candidates made valid and at times insightful suggestions of how user-generated reports via blogs, social media and collaborative documents could be used by the museums’ managers or how public access to the databases could constitute advantages and disadvantages for the museums/museums’ managers. Again, far too many candidates ignored the specified stakeholder or made very generic comments about sharing information.

Question 2 (Online learning on your own device):

(a)(i) Most candidates were able to gain marks on this question part. Although the question asked for online *activities*, many candidates merely responded with the name of tools (e.g. “forum”). Where these suggestions clearly implied an online activity, marks were awarded. However some suggestions (e.g. “homework”) were too vague to be accepted.

(a)(ii) In contrast to part (i), this question part specifically asked for *IT tools that could be used by students to complete their group work*. Most candidates were able to gain marks for this part. Some candidates suggested hardware with no indication of how this related to completing group work. In these cases marks could not be awarded. It’s important that candidates read and understand the totality of the question asked and ensure that their suggestions satisfy its specific demands, even for “identify” questions.

(b) Although most candidates gained at least some marks for this question, responses all too often failed to reach the upper mark bands. The question by its nature demanded some degree of speculation, however many candidates made unsubstantiated, over-generalised assertions about either online courses or courses completed by attending class. Many candidates did not focus their answer on the context of the question (details given on a degree certificate) and as a result went off-course in their responses and made little or no reference to the given scenario. Many candidates had scant knowledge or understanding of the nature of online courses offered by universities and assumed that they were not facilitated or even monitored by a human teacher.

(c) Many candidates answered this question well and some gained marks in the upper mark bands. For those that didn’t, the reasons were mainly centered on a recurring problem: A failure to focus the response on the specified stakeholder (a school). Some candidates wrote

lengthy responses that focused entirely on the student and/or parents, which attracted few marks.

A significant number of candidates misread the question and assumed that it was Mountains University that was implementing the scheme, although wherever possible examiners accepted valid responses that specified implications for the university in order to avoid penalising candidates unduly for a minor misinterpretation of the scenario.

Question 3 (Our interconnected world):

(a)(i) Although many candidates were able to gain at least one mark for this question part, a surprising number had little understanding of the nature of the internet. The World Wide Web (WWW) was somewhat better described but was by no means universally understood.

(a)(ii) Many candidates simply quoted verbatim the section in the scenario that stated that a router provided connection to the internet via an ethernet connection or WiFi, which attracted no marks. Some candidates had a clear understanding of the specific roles played by a router. Although in-depth technical knowledge was not required to gain marks, many candidates offered very generalised suggestions that were often more pertinent to a hub, switch or wireless access point.

(a)(iii) Most candidates were able to gain at least one mark on this question part and many achieved both marks. There appeared to be a confusion over what constitutes a “domain name”. Many candidates suggested that the domain name was “Khan Academy”, which is not correct and was not accepted.

(b) Most candidates were able to describe at least some potential advantages and disadvantages of home internet connections and hotspots. Some candidates misinterpreted “hotspot” to mean mobile phone tethering. Although tethering is sometimes described as creating a hotspot, this interpretation clearly did not fit the scenario given (which stated that the students had rented a house “*near a free hotspot that can be used from inside the house*”). Many candidates did not focus their answer on the context of the scenario and interpreted the question as encompassing home internet connections and hotspots in general, although examiners gave credit to valid points raised wherever possible. Where candidates failed to reach the upper mark bands this tended to be due to a lack of analysis. Many responses were essentially a list of characteristics of home internet connections and hotspots with little attempt to explore the implications of either beyond rudimentary statements.

(c) Most candidates were able to gain at least some marks for his question part. Many of the responses consisted largely of over-generalised assertions that ultimately reduced to a list of “things that can be done with the WWW” rather than a well-considered analysis of the claim made by Tim Berners Lee.

Some candidates either ignored the command term “to what extent...” altogether or merely stated whether they agreed or disagreed with the claim with little attempt to relate that to their preceding statements. The better responses presented a balanced exploration of claim and counterclaim leading to a substantiated and well-reasoned conclusion.

Section B:

This year questions four and seven covered section 3.11 of the syllabus while questions five and six covered section 3.10 of the syllabus. In the 2017 exams, all section B questions will deal with both sections 3.10 and 3.11.

A very limited number of candidates answered questions four and six. Almost no candidates answered question five. The vast majority of candidates chose question seven. The comments below reflect this pattern of choices. All comments should be read with reference to the exam questions and markscheme.

Question 4 (A computer has graded my essay!):

In all three parts of this question, student had difficulty in using precise language to identify characteristics and define terms.

(b) (i) Candidates either had a very clear idea of why neural networks are useful as well as a good basic idea of how they work, or had no understanding at all. This dichotomy suggests that it is quite possible for candidates to acquire a conceptual understanding of neural networks that they can apply to a specific situation. Precise details are not needed but the basic concepts are important and can be taught.

(b) (ii) Most candidates seemed to have a basic understanding of the difference between fuzzy logic and inference rules, but often struggled to explain that difference clearly.

(c) Often candidates did recognize the potential strengths and weaknesses of this kind of software, but few thought about how the use of the software would affect the student's learning. For example, candidates did realize that the software could provide instant feedback, but did not explore the implications of that access to feedback.

Question 5 (Better Than Ever Health Clinics (BTEHC)):

Almost no candidates answered this question.

Question 6 (Upgrading Weston Bank's information system):

A limited number of candidates answered this question.

Most candidates could identify items that would be included in a feasibility study and failures that could arise if employees are not adequately trained. Candidates had some difficulty identifying actions that must be taken when the old system is phased out.

Responses here were uneven. Often candidates attempted to turn the question into a comparison between phased and direct changeover. However, the question states that the bank is retaining a legacy system, not phasing it out. The focus, therefore, was on why the bank would see a need to retain the legacy system i.e. what needs might it fulfil and what problems might result from the need to run two systems in parallel.

Candidates who did well on this question realized that focusing on the skills and personalities of the team had value, but that a project development method could provide needed structure. However, nearly all answers remained at a high level of generality i.e. candidates could identify issues but not build an argument using description, examples, and analysis.

Question 7 (Robotic watchmen):

- (i) Nearly all candidates were able to answer this question accurately.
 - (ii) Voice recognition could be interpreted in two ways (see the markscheme). For the most part, candidates did have some notion of one of these types of voice recognition but had difficulty formulating a clear definition. Stating that the computer recognizes a person's voice is vague and indicates circular reasoning.
 - (iii) Candidates are still not clear on a definition of robot. Once again this indicates a need for conceptual understanding of terms.
- (b) (i) This question invited rather generalized answers but many candidates could provide a reason for robots' difficulty in recognizing what is normal and what might be a threat.
- (b) (ii) Almost no candidates knew the definition of android, so they provided answers that could apply to any type of robot.
- (c) Many candidates did quite well on this question. They were able to describe benefits and problems of each approach, often with analytical comments. There were some instances of misinterpretation i.e. candidates did not read the question carefully and did not realize that these patrols would be conducted at night when there would be no customers in the mall.

Recommendations and guidance for the teaching of future candidates

- Concepts should be taught in specific contexts so candidates can see how the concepts relate to real world conditions. Then, candidates should be presented with a new scenario (context) and asked to apply what they have learned to that new situation. This can be done by using current news articles from reliable sources and creating activities that require candidates to provide supported arguments and to evaluate the impacts of information technology on specific stakeholders.
- Candidates should keep a record of what is learned in class including copies/links to news articles discussed, notes on concepts which have been taught, copies of formative assessments and so. The format does not matter as long as the candidates have an organized body of material to review before the exam.
- Teachers should participate in any Special Events on the OCC in order to deepen their knowledge about assessment.
- Teach candidates how to read questions carefully so that they do not miss key elements or misinterpret the question entirely. Strategies that may help candidates include underlining or circling key words, looking at the stem of the question carefully to identify key stakeholders and IT concepts and to be sure they understand how the technology is functioning in this particular scenario.
- Candidates need to be thoroughly familiar with the markbands and the command terms. This can be done by using them for formative assessments by having candidates use them to evaluate their own work and/or the work of other candidates, and by applying them to samples such as those available on the OCC.

Standard level paper one

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 4	5 – 8	9 – 13	14 – 17	18 – 22	23 – 26	27 - 40

The areas of the programme and examination which appeared difficult for the candidates

Given the overlap between the HL and SL papers (three out of the four SL questions also appeared on the HL paper), these comments should be read in conjunction with those offered for the HL paper. However certain aspects mentioned in the HL comments are worth reiterating and reinforcing here as they are such commonly recurring issues that frequently have a serious impact on the marks gained by candidates:

- Read the question carefully. Candidates must be taught to take particular notice of the part of the question that includes the command term and ensure that their answer addresses and satisfies that instruction. Far too often questions merely elicit lengthy descriptions with little focus on the actual question that was asked. There seems to be a misconception among some candidates that any question, particularly for parts (b) and (c), can be adequately answered by providing a table of “advantages” and “disadvantages”. This is not the case. Such tables almost invariably end-up being a set of descriptive bullet points which offer little in the way of analysis, substantiated argument or supported conclusions.
- Focus the response on the specified stakeholder(s). Although it may be relevant or even necessary to bring other stakeholders into the response, this should be done in order to supply information or perspectives that are then related to the specified stakeholder.
- Set the answer in the context of the given scenario. Too many candidates are either ignoring the given scenario altogether or overly generalising their responses. Explicit reference must be made to the given scenario throughout the response.
- Use the information given in the scenario as a starting-point to develop a response. Candidates should be clear that although reference should be made to the scenario throughout the response, credit will not be given for simply repeating the information given. The best responses not only make explicit references to the scenario but also use the specific details of it as a starting point to develop detailed, balanced and well-substantiated arguments.

The areas of the programme and examination in which candidates appeared well prepared

In many cases, candidates appeared to have a reasonably detailed knowledge of the IT systems involved and at times were able to offer precisely focused references to the underlying technology. It is important that candidates are encouraged to use that greater systems knowledge to link the IT systems involved to the social and ethical issues under consideration and demonstrate clearly the contribution the IT systems make to the points being discussed.

As suggested in the HL section, the reduction of the number of questions that were required to be answered did allow candidates to cover more ground in their responses, particularly for parts (b) and (c). There was less evidence of candidates running out of time. It is important that candidates are taught to use their time wisely. Marks will be gained by offering a deeper analysis, reasoned arguments and balanced discussion. Simply extending descriptive responses to include more description will not attract significantly more marks.

The strengths and weaknesses of the candidates in the treatment of individual questions

In this session there were three questions that were common to both papers. They were as follows:

HL/SL Q1 - Public access to art museum databases

HL/SL Q2 - Online learning on your own device

HL/SL Q3 - Our interconnected world

The comments for these common questions are included within Section A of the HL Paper 1 comments on specific questions.

Question 4 (Is that the original photograph?):

(a)(i) Most candidates were able to suggest two plausible sensors that a trail camera might have.

(a)(ii) Lossy compression was reasonably well understood by many, at least in general terms. Lossless compression was far less clearly understood. Questions that demand some understanding of data compression occur fairly regularly on exam papers and candidates should have a clear knowledge of the basic characteristics of and differences between the two main types.

(a)(iii) Most candidates were able to suggest two techniques that could be used to digitally manipulate a photograph. Where candidates lost marks this was often due to suggesting a tool or software application (e.g. Photoshop) rather than a specific technique.

(b) Many candidates were able to score up to half the available marks for this question part for demonstrating some generalised knowledge of the three specified stages (requirements specification, project schedule and product design). However given that all these stages are present in the internal assessment (project) and therefore should have been addressed in some detail by all candidates during the course, the clarity of understanding of their nature and the contribution each stage makes towards the success of the final product (in this case the video) was often surprisingly superficial.

(c) Most candidates were able to offer some valid suggestions for social and ethical issues arising from the manipulation of images to enhance the products or to make the models look more attractive. As is so often the case with part (c) questions, the responses often tended to be generalised rather than set in the context of the given scenario and descriptive rather than analytical in their treatment. The better answers recognised that the social and ethical implications of manipulation may change depending on what was being manipulated, to what extent and for what intended purpose.

Recommendations and guidance for the teaching of future candidates

- These recommendations should be read in conjunction with the HL recommendations as many are applicable to both levels.
- Teachers and candidates must be aware that while markschemes from past exams are a useful resource for teachers, they do not necessarily exemplify how a candidate's response should be structured. This is particularly relevant for part (b) and part (c) questions. The presentation of possible responses as a bullet-point list or table of advantages and disadvantages on the mark scheme merely provide examiners with a set of guidelines. Markschemes are not model answers and should not be treated as such. Candidates should be taught to structure their responses as a balanced, well-argued and substantiated discussion that addresses and answers the question asked.
- Candidates must be encouraged, challenged and supported to draw connections between the specified stakeholder(s), the IT systems involved and the social and ethical issues arising from the context of the scenario. The ITGS triangle remains the key focus point and this should be highlighted throughout the ITGS course. Teachers must be aware that the links between the strands are as important as the information within each strand.

Higher & standard level paper two

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 3	4 – 6	7 – 9	10 – 12	13 – 15	16 – 18	19 - 26

General comments

The article about the introduction and use of a GPS-based fitness smartphone app was easily accessible to candidates. Also the article contained concerns and benefits that were used by a substantial number of candidates. However, some candidates fell into the trap of only including these and not demonstrating their own knowledge and understanding of ITGS issues and the IT system. This was apparent from a comparison of marks between various examination sessions and resulted in a change in the lower end grade boundaries.

However, even though it was clearly apparent that the candidates could easily access the article, the depth of analysis and evaluation was lacking in the same way as in previous examination sessions. In particular the material presented in Criterion C lacked detailed development from an identification of an issue to a description of its impact, and the identification of the ONE solution in Criterion D lacked further development into a description of who, what and where. Teachers need to emphasize that it is not enough to identify issues and problems but to develop these into detailed impacts and solutions. Without the details analysis, an evaluation cannot take place.

The areas of the programme and examination which appeared difficult for the candidates

The total marks for the paper is 26 and since there were very few conclusions, and even fewer justified conclusions, the top markbands in Criterion C and Criterion D were rarely entered. This effectively made a mark of 22 the highest one achieved. Teachers need to concentrate for the next session on developing this higher order thinking skill in the candidates.

The conclusions that were provided were often a summary or an additional evaluation comment. In Criterion C the conclusion needs to be a justified statement coming down on one side or the other, about the overall effect of the impact of the use of the information system. For Criterion D an overall justified evaluation of the effectiveness of the solution being a good solution or not is required, by comparing the negative and positive evaluations described previously. Ideally the conclusion should justify the overall impact/solution as being a mixture of positives and negatives that mostly counterbalance each other.

The areas of the programme and examination in which candidates appeared well prepared

Again it was pleasing to see structured responses in criterion C and D. However the use of a standard structure did not lead to an increase in the display of higher order thinking skills needed for the higher marks in Criterion C and Criterion D. As usual there were still a small number of candidates who included more than one solution in Criterion D

The strengths and weaknesses of the candidates in the treatment of individual questions

Criterion A

Part A

All except a very small number of candidates were able to identify a concern arising from the use of the fitness app, especially since the article contained a number of them. However, it was not uncommon to find a response that did not include an explicit description of the impact, result, consequence, effect or outcome of the concern; in other words, why it is a concern. Also a number of candidates specified 'hacking' as a concern when clearly it did not apply to the article as the data was open for all to see and use once they had registered. Another point of concern was the identification of privacy and security as the one concern. Candidates need to be taught there is a difference even though there is some causal link between them. The candidates need to choose one or the other for this question.

Part B

As usual most candidates answered this question well – specifying who the stakeholder was from the article, the part of the IT system they were using or associated with and what was being done with the IT. Candidates who did not do well did not refer to the article enough and relied on general descriptions that applied to any IT system.

Criterion B

Part A

For this question candidates were required to describe the step-by-step process for using the fitness app and describing how the app worked. The article included a good general description of the three major steps: the access process to set up the app in order to use it, how the app operated and where and how the data was stored, and how to view and share the information. Considering the limited space in the answer booklet candidates needed to address at least two of these three aspects in some detail. Candidates are encouraged to use an extra booklet for extended responses to this question, and for other criteria.

There are still a significant number of candidates who seem not to realise that the repetition of the material in the article does not demonstrate their knowledge and understanding of the IT system. In order to obtain the higher marks candidates are meant to describe the internal workings of the app and associated software and hardware. The number of developments

beyond the material in the article to achieve the highest marks is usually at least four. For an example of development, 'the location data is stored in the app and on the website' should be developed into references to the internal memory of the smartphone, Wi-Fi connection, the website server and the database on the server and more. The markscheme contains a detailed list of such developments. There were a number of candidates who clearly had not studied GPS systems and thought the satellites calculated the location and sent it to the mobile device. This question and part b, along with Criterion D are opportunities for candidates to display their technical IT knowledge.

Part B

Candidates needed to explain the link between two items, how the concern could come about and why it could happen due to a weakness in the IT system and its use. Many candidates basically repeated what was written in Criterion A, part 1(a). The connection between the IT system and the concern is required but few candidates included specific reference to parts of the IT system that enabled the impact of the concern to happen. For this article the major IT reason WHY was a negative one which many students did not seem to be aware of: the absence of any security measures control, and policies to govern, the use of the data. Candidates need to be aware that the IT that is missing is often the most important factor why. Some candidates picked up on the lack of testing of the app as the reason why there were problems and usually extended this to produce very good responses to Criterion D.

Criterion C

It was clear that most candidates knew that a structure was required for the response and provided one based on the various stakeholders or the various issues from the ITGS guide. The most successful were those based on the stakeholders as it enabled them to provide a balanced set (at least two of each for at least two stakeholders) of positive and negative impacts. As has been mentioned above a conclusion about the overall impact (positive or negative) of the fitness app cannot be argued unless there is a balanced comparison of impacts that can be used to justify the conclusion.

Without these candidates cannot move into the top of the middle markband and beyond. A detailed example was included in the November 2015 Subject Report.

As was mentioned above a significant concern was the number of candidates who identified impacts but did not provide details describing the impact.

Criterion D

In this session candidates were asked to identify the problem before providing a response. All candidates filled in this section which was meant to help provide a focus, but a number included more than one problem and then went on to include more than one solution and penalised themselves. Remember: only the FIRST solution will be marked. Most candidates were able to identify a solution to one of the problems found in question C but often the problem was not specified in sufficient detail to be of help when providing a conclusion about the overall effectiveness of the solution. The problem needs to be framed with reference to specific stakeholders and addressed in the conclusion. As mentioned above a significant

number of candidates did not provide enough detailed description about the solution, especially technical details (who, where, when, what, how) or details of policies that need to be implemented. The solution must be effectively applied to show how it solves the specific problem. Then candidates need to provide a balanced set of at least two further positive and two negative evaluations of the effectiveness of the solution in solving the problem. These must be used in the conclusion that argues that the solution overall was effective, or not effective, in solving the problem.

Recommendations and guidance for the teaching of future candidates

In the previous sections there has been advice provided for teachers to use when advising candidates about how to respond to each criteria. Examples of the problems and how to overcome them have been included and more can be found in the published markscheme. As usual there is little evidence of candidates going back to Criterion A and Criterion B and revising their responses. Considering the significant number of inadequate responses for these criteria that could easily be remedied candidates need to review their responses.

For Criterion C and Criterion D teachers need to move beyond the structural necessities to emphasizing the critical thinking skills required. The previous examiners reports and the comments and examples above indicate what is required to achieve these marks; and the markscheme clearly shows how the marks are awarded when a candidate demonstrates the appropriate critical thinking skills.

Candidates need to practice responding to various scenarios using the criteria; and also critiquing each other responses based on the comments above and the marking instructions in the markscheme.

Higher level paper three

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 4	5 – 9	10 – 15	16 – 18	19 – 20	21 – 23	24 - 30

General comments

It was good to see that the candidates were able to write clearly and articulately. This was an improvement on previous years. This year, the flow of cognitive thinking was much clearer and easier to follow for the examiners. Candidates managed to stay on topic a lot more and also craft responses that focussed on what they should be answering.

The areas of the programme and examination which appeared difficult for the candidates

As with previous years, the higher order thinking questions (Question 3, Question 4) was difficult for candidates to demonstrate analysis and research. It is vitally important that teachers provide opportunities to students to practice this and to get relevant and appropriate feedback. Many candidates were answering Question 3 and Question 4 with short responses that were highly descriptive and lacked any formal depth to the analysis.

Some candidates were not able to answer questions from the Case Study on specific terminology that was included in the “additional terminology” section. It is important that teachers carefully go through the Case Study and evaluate and look at areas that have specific terminology, specific the list of words and topics at the end that will definitely be used to formulate questions. It was evident that many candidates had not done this.

The areas of the programme and examination in which candidates appeared well prepared

It was evident that there were some schools where candidates had carried out thorough research. Some were able to mention visiting a smart home or calling a company that develops smart homes using Skype. Candidates have a year to carry out the additional research and are expected to incorporate this into their responses.

The strengths and weaknesses of the candidates in the treatment of individual questions

Question 1

- Some candidates chose valid features but were not clearly explaining how they are useful for elderly or disabled people. The features could be useful for anyone, but nothing was explained about the application for the two focus groups -- and that was necessary to score full marks.
- Some candidates did not identify specific features, but spoke about two reasons a smart house (in general) could be good for elderly and disabled; many answers were too general, too generic, or sometimes too vague.
- Some candidates referred to gadgets or devices which were not smart home features.

Question 2a

- Mostly well answered - but some candidates didn't include the words IF and THEN (mostly THEN): as they are key elements of an IFTTT recipe. Candidates who forgot one of these terms (usually "then") could not score maximum marks.
- Some recipes were either way too complicated or too simple.
- Some recipes were also very vague and the trigger component was not something that could be measured with a sensor (such as temperature) or system value (such as time or date).

Question 2b

- Some candidates repeated the same technical issue and just gave 2 consequences of it, so therefore only received 3 marks. Otherwise generally well answered.
- Some candidates wrote about "one unreliable device and one network failure", others about "two unreliable devices", others still about "two problems from a network failure"; all these combinations were possible (and credited).
- Some candidates talked about two devices having malfunctions - so this is classed as repetition instead of two different situations or issues.

Question 3

- There was some confusion between automation and smart home integration.
- Most candidates focused on the question with only a few talking generally about Smart home features, benefits and issues.
- A few saw the device manager as a person. This is disappointing as it should have been part of preparation for the case study and part of the terminology.
- Some candidates spent too much time talking about the devices and their features and not linking back to the HCI or device manager aspect of the question.
- There were lots of "boilerplate" answers where some were literally word-for-word with several students giving the same long answers as though they had prepared in class. While the answers were ok in some cases, it critical that the response is linked to the actual question.

Question 4

- Some candidates got confused by the word “cloud” and started to talk about free storage space and bandwidth for transferring files. They know cloud as a storage service such as Google drive and Dropbox so some got confused.
- Some candidates focused on the word “portal” and got side-tracked about Brix Homes using an app or a website (portal) in contrast with the HCI device manager of the previous question
- A lot of candidates talked only about whether the company should provide a portal rather than whether or not they should outsource it to a 3rd party provider; by the same token, some other students wrote about Brix Homes working with a third party, but missing out the focus on the cloud based portal service.
- There was a lot of shoehorned essays about various different topics (generally with pros and cons) and a final paragraph relating them (tenuously) back to the question.
- Some candidates went into a lot of detail about the devices that could be controlled through a cloud portal but barely answered the main issue. This is generally a sign that candidates are not familiar with the command terms and how to carry out analysis.
- A number of candidates seemed to be unclear about what proprietary means and were confused by the question.
- It was pleasing to see that an increasing number of candidates made reference to their primary or secondary research; some were able to mention what some companies already do in terms of Smart Homes (e.g. Samsung) or could refer to what they had read (e.g. in wired.com). Many candidates had seemingly visited “smart homes”, which was a good learning experience (irrespective of the quality of their answers)

Recommendations and guidance for the teaching of future candidates

For the Case Study, students as well as teachers, should link in with available sites that will assist students' preparations for the paper. There is the IB OCC which is a great forum site for ITGS teachers, the ITGSopedia site which uses a number of techniques to collect appropriate ITGS resources, as well as the new and annual Facebook Case Study group.

There was evidence of some independent research, however some of it was off topic and not relevant. Also some of the independent research seemed like it could have come from common sense more than actual research. Teachers should be exposing students to real life situations that link in with the core issues of the Case Study. Also teachers should take opportunities throughout the year to have students writing practice responses that particularly look at how to incorporate independent research. There has been an improvement on this from past years, however there is more work to be done.

As mentioned earlier, students should develop a case study list of appropriate terminology that could be incorporated into their responses so that they are able to demonstrate some higher order thinking. There is a list of specific case study terminology that are used to craft questions and some students were not able to answer these questions. These key terminologies listed on the case study are perform launch pads for class discussion and independent research.

Students should also be practicing analysis of situations. Many candidates stopped at the descriptive phase of responses and therefore did not and could not reach the high mark bands.