**OCR**
RECOGNISING ACHIEVEMENT

**Advanced Subsidiary GCE**

**COMPUTING**

Unit F451: Computer Fundamentals

**Specimen Paper**

**F451 QP**

Time: 1 hour 30 minutes

Candidates answer on the question paper.

Candidate
Name

Centre
Number

Candidate
Number

**INSTRUCTIONS TO CANDIDATES**

• Answer **all** the questions.

**INFORMATION FOR CANDIDATES**

• The number of marks is given in brackets [ ] at the end of each question or part of question.
• The total number of marks for this paper is **100**.

**ADVICE TO CANDIDATES**

| FOR EXAMINER'S USE | | |
|---|---|---|
| | **Max** | **Mark** |
| **1** | **4** | |
| **2** | **13** | |
| **3** | **19** | |
| **4** | **12** | |
| **5** | **20** | |
| **6** | **14** | |
| **7** | **5** | |
| **8** | **13** | |

This document consists of **12** printed pages.

Answer **all** questions.

**1 (a)** Describe the difference between systems software and applications software.

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**(b)** State **two** reasons why it is necessary to have at least one storage device in addition to the computer's memory in a computer system.

Reason 1 ......................................................................................................................

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Reason 2 ......................................................................................................................

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**2** A systems analyst has been employed to update a computer system in a business.

**(a)** The analyst needs to collect information about the requirements of the new system.

State **three** ways to collect information, giving an advantage and a disadvantage of each.

Way 1 ......................................................................................................................

Advantage ..............................................................................................................

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Disadvantage .........................................................................................................

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Way 2 ......................................................................................................................

Advantage ..............................................................................................................

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Disadvantage .........................................................................................................

...........................................................................................................................**[3]**

Way 3 ......................................................................................................................

Advantage                                      ..............................................................................

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Disadvantage .........................................................................................................

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**(b)** Describe the waterfall model which can be used to document the system life cycle.

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**(c)** The completed solution includes user and technical manuals.

State the purpose of each manual.

User manual ............................................................................................................

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Technical manual ....................................................................................................

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**3 (a)** State **three** differences between the use of a LAN and a WAN.

Difference 1 ...............................................................................................................

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Difference 2 ...............................................................................................................

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Difference 3 ...............................................................................................................

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**(b)** When data is transmitted across a WAN it is often sent using packet switching.

Describe how a file of data can be transmitted from one machine to another across a WAN using packet switching.

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**(c)** When data is transferred across a network it may become corrupted.

**(i)** Describe how an echo can be used to check for errors in data transmission.

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**(ii)** Describe **two** alternative error checking methods which may be used when data is being transmitted across a network.

Method 1 ......................................................................................................................

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Method 2 ......................................................................................................................

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**(d)** **(i)** Define what is meant by a protocol.

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**(ii)** Explain the use of http in the transfer of data across the internet.

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**4 (a) (i)** Write the number 90 as a binary number in a single byte.

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**(ii)** Write the number 90 as a number in octal.

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**(iii)** Explain the relationship between the binary and octal representations of the number 90.

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**(b) (i)** Write the number -90 as a two's complement binary number in a single byte.

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**(ii)** Write the number -58 as a two's complement binary number in a single byte.

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**(iii)** Add the two answers obtained in (i) and (ii) in a single byte.

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**(iv)** Explain the result.

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**5** Patient monitoring in an intensive care ward in a hospital is to be computerised.

**(a)** Important measurements are taken automatically from each of the patients in the ward.

State **two** measurements which will be required and state the hardware required to capture each.

Measurement 1 ........................................................................................................

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Hardware.................................................................................................................

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Measurement 2 ........................................................................................................

 ................................................................................................................................

Hardware.................................................................................................................

 ....................................................................................................................**[4]**

**(b)** The ward is to be run by one nurse.

State **two** different forms of output which may be used to give the nurse information on the patients. For each format, give an example of its use and state why it is appropriate.

Output 1...................................................................................................................

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Example of use........................................................................................................

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Reason ....................................................................................................................

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Output 2...................................................................................................................

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Example of use........................................................................................................

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Reason ....................................................................................................................

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**(c)** Discuss the likely effects of this computerisation on the people involved.

(The quality of written communication will be assessed in your answer to this question.)

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**(d)** Explain why custom-written software would be appropriate in this computer application.

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**6 (a)** State **three** different buses used in a computer system, describing what each is used for.

Bus 1 ..............................................................................................................................

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Bus 2 ..............................................................................................................................

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Bus 3 ..............................................................................................................................

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**(b)** Two of the parts of a computer are the memory unit and the ALU.

**(i)** State **two** items that would be found in the memory unit.

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2 ....................................................................................................................................

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**(ii)** State **two** uses of the ALU.

1 ....................................................................................................................................

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2 ....................................................................................................................................

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**(iii)** Describe **two** special registers, other than the ALU, which are found in the processor.

Register 1 .......................................................................................................................

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Register 2 .......................................................................................................................

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**[Turn Over**

**7 (a)** Explain the meaning of the term transparency in a network operating system.

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**(b)** Explain how printing is carried out by a network operating system when there is only one printer available.

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**8** A business exists which specialises in supplying laptop computers to students. The business maintains a large customer base and carries out full servicing on the laptops. It carries a full stock of all the different types available.

The managing director, Karen, decides to computerise the administration of the business.

**(a)** State **three** different types of applications software which Karen may decide are necessary for running the business, saying what they would be used for.

Type 1 ...................................................................................................................

Use .......................................................................................................................

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Type 2 ...................................................................................................................

Use .......................................................................................................................

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Type 2 ...................................................................................................................

Use .......................................................................................................................

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**(b)** The office staff will use a GUI interface, while the people who take orders over the telephone will use a form-based interface.

**(i)** Describe each of these interfaces.

GUI .......................................................................................................................

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Form-based ...........................................................................................................

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**(ii)** Explain why a forms interface is appropriate for use by workers taking orders over the telephone.

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**Paper Total [100]**

# COMPUTING                                    F451 MS

Unit F451:  Computer Fundamentals

**Specimen Mark Scheme**

The maximum mark for this paper is **100**.

| Question Number | Answer | Marks |
|---|---|---|
| **1(a)** | **Describe the difference between systems software and applications software.** | |
| | • Systems software controls the hardware/makes the system useable by the operator. | |
| | • applications software allows the user to carry out a useful task (which would need to be carried out even if computers did not exist). | |
| | [1 per bullet] | **[2]** |
| **1(b)** | **State <u>two</u> reasons why it is necessary to have at least one storage device in addition to the computer's memory in a computer system.** | |
| | • Contents of memory lost when power switched off | |
| | • size of memory not sufficient to store all the software/data required | |
| | • need to import/export files. | |
| | [1 per bullet, max 2] | **[2]** |
| **2** | **A systems analyst has been employed to update a computer system in a business.** | |
| **2(a)** | **State <u>three</u> ways to collect information, giving an advantage and a disadvantage of each.** | |
| | Interviews: | |
| | • allow departure from prepared script/allows interviewee to elaborate on points/makes clients believe they are fully involved; | |
| | • time consuming/only gives the view of one person/biased views can be anonymous/cost effective. | |
| | Questionnaires: | |
| | • allow a large number to have their say in a short time/allows all to feel involved; | |
| | • very rigid structure/does not allow individual points/person filling it in may feel rail roaded/poor return. | |
| | Observation of current system: | |
| | • see system "warts and all"/see system with new eyes/see information workers may feel not important; | |
| | • workers may not act naturally/may not see 'abnormal' procedures/business may be cyclical. | |
| | Collection of documentation: | |
| | • gives clear indication of inputs and outputs necessary/shows what workers and management find acceptable; | |
| | • present documentation may not be effective/may be difficult to understand without more information. | |
| | [1 mark for each way stated, and 1 per advantage, 1 per disadvantage; max 3 methods, max 9 marks] | **[9]** |

| Question Number | Answer | Marks |
|---|---|---|
| 2(b) | **Describe the waterfall model which can be used to document the system life cycle.**<br><br>• The results from one stage are used to…<br><br>• inform the work on the next stage in the cycle…<br><br>• at any stage it may be found necessary to return to re-evaluate a previous stage.<br><br>[1 per bullet, max 2] | **[2]** |
| 2(c) | **The completed solution includes user and technical manuals.**<br><br>**State the purpose of each manual.**<br><br>User manual<br><br>• Gives instructions to software users to allow them to successfully produce the desired results/explain error messages/what the user has done wrong.<br><br>Technical manual<br><br>• Describes how the system works/useful for technician who may need to alter the system in the future. | **[2]** |
| 3(a) | **State three differences between a LAN and a WAN.**<br><br>• LAN is one site/WAN geographically remote;<br><br>• LAN is hard wired or wireless from central point/WAN tends to use external communications;<br><br>• LAN more secure/WAN subject to attack;<br><br>• LAN requires no extra communication device/WAN requires modem.<br><br>[1 per bullet, max 3] | **[3]** |
| 3(b) | **Describe how a file of data can be transmitted from one machine to another across a WAN using packet switching.**<br><br>• File divided into groups of bits (packets)<br><br>• of standard size<br><br>• made up of control bits, data and destination address<br><br>• packets are individually sent across the network<br><br>• across different routes<br><br>• packets must be ordered at destination to recreate data.<br><br>[1 per bullet, max 5] | **[5]** |

| Question Number | Answer | Marks |
|---|---|---|
| **3(c)(i)** | **Describe how an echo can be used to check for errors in data transmission.**<br><br>• Data is sent back to origin<br>• where it is compared to original<br>• any differences will signify a transmission error<br>• the original data is re-sent.<br>[1 per bullet, max 3] | **[3]** |

| Question Number | Answer | Marks |
|---|---|---|
| 3(c)(ii) | **Describe two alternative error checking methods which may be used when data is being transmitted across a network.**<br>• Parity check<br>• extra bit added to data byte<br>• which makes the number of ones in the byte either always odd or always even<br>• checksum<br>• the data bytes are added together ignoring any overflow<br>• the calculation can be repeated at the destination and compared with the transmitted sum.<br>[1 per bullet, max 4] | **[4]** |
| 3(d)(i) | **Define what is meant by a protocol.**<br>• A set of rules<br>• to govern the communication of data.<br>[1 per bullet] | **[2]** |
| 3(d)(ii) | **Explain the use of http in the transfer of data across the internet.**<br>• A protocol<br>• which controls the transmission of web pages<br>• identifies the address of a web page<br>• designed to handle the links within the page.<br>[1 per bullet, max 2] | **[2]** |
| 4(a)(i) | **Write the number 90 as a binary number in a single byte.**<br>01011010<br>[1 per nibble] | **[2]** |
| 4(a)(ii) | **Write the number 90 as a number in octal.**<br>132<br>[1 mark for the 1, 1 mark for 32] | **[2]** |
| 4(a)(iii) | **Explain the relationship between the binary and octal representations of the number 90.**<br>• Groups of three binary bits (from the right)<br>• give octal digits when converted into decimal values. | **[2]** |

| Question Number | Answer | Marks |
|---|---|---|
| **4(b)(i)** | **Write the number -90 as a two's complement binary number in a single byte.**<br>10100110 | **[1]** |
| **4(b)(ii)** | **Write the number -58 as a two's complement binary number in a single byte.**<br>11000110 | **[1]** |
| **4(b)(iii)** | **Add the two answers obtained in (i) and (ii) in a single byte.**<br>01101100<br>[1 per nibble] | **[2]** |
| **4(b)(iv)** | **Explain the result.**<br>• Answer is +108 but it should be -148<br>• the largest magnitude negative number in a byte is -128<br>• so the answer cannot be represented.<br>[1 per bullet, max 2] | **[2]** |
| **5** | **Patient monitoring in an intensive care ward in a hospital is to be computerised.** | |
| **5(a)** | **Important measurements are taken automatically from each of the patients in the ward.**<br>**State two measurements which will be required and state the hardware required to capture each.**<br>• Blood pressure/pressure sensor (on inflatable sleeve)<br>• pulse/pressure device on vein<br>• temperature/thermistor (thermometer)<br>• breathing/sensor on valve in breathing tube.<br>[2 per bullet, max 4] | **[4]** |
| **5(b)** | **The ward is to be run by one nurse.**<br>**State two different forms of output which may be used to give the nurse information on the patients. For each format, give an example of its use and state why it is appropriate.**<br>• Sound/emergency problem (outside parameters)/immediate attention getter<br>• light/problem with specific patient/light can be specific according to location (sound cannot)<br>• graphical/present and recent past measurements/makes for easy trend spotting, visual comparison with parameters | |

| Question Number | Answer | Marks |
|---|---|---|
| **5(b) Cont'd** | • reports, text, hard copy/for archive purposes/to allow analysis of patient condition if an event were to occur. | |
| | [3 per bullet, max 2 bullets, max 6] | **[6]** |
| **5(c)** | **Discuss the likely effects of this computerisation on the people involved.** | |
| | **High level response [6-8 marks]** | |
| | Candidates will show a clear understanding of the problem and answer the question. | |
| | Candidates will accurately and clearly, as a minimum give both positive and negative implications and a discussion will take place. | |
| | The information will be presented in a structured and coherent form appropriate to a discussion. | |
| | There will be few if any errors in spelling, grammar and punctuation. | |
| | Technical terms will be used appropriately and correctly. | |
| | **Medium level response [3-5 marks]** | |
| | Candidates will show an understanding of the problem and may answer the question from one viewpoint only. | |
| | Candidates may only give either positive or negative implications | |
| | The information will be presented in a structured format appropriate to a discussion. | |
| | There may be occasional errors in spelling, grammar and punctuation. | |
| | Technical terms will be mainly correct. | |
| | **Low level response [0-2 marks]** | |
| | Candidates may demonstrate a limited understanding of the problem. | |
| | Information may be a list of points, with no implications. | |
| | Information will be poorly expressed and the presentation of the information may not be appropriate for a discussion. | |
| | There will be a limited, if any, use of technical terms. | |
| | Errors of grammar, punctuation and spelling may be intrusive. | |
| | **Points to be made:** | |
| | • Nurse needs training | |
| | • may be unable to adapt to new work practices | |
| | • may qualify for promotion/increased pay because of better qualifications | |
| | • may be redundancy issue | |
| | • patients/relatives may be concerned about lack of human contact | |
| | • lower standard of care because of reliance on machines | |
| | • conversely, may be happier because of reduction in chance of human error | |
| | • reduction in staff may jeopardise care if more than 1 patient goes critical | |
| | • saving of costs may result in more patients/wards possible | |
| | • reduced waiting times as a result of the above | |
| | • nurse given far more responsibility | |
| | • may have problem in accepting so much responsibility – easier if decisions are shared. | **[8]** |

| Question Number | Answer | Marks |
|---|---|---|
| **5(d)** | **Explain why custom-written software would be appropriate in this computer application.**<br>• Application is a one-off<br>• consequently, the applications software will not previously exist<br>• need to support unusual hardware configuration.<br>[1 per bullet, max 2] | **[2]** |
| **6(a)** | **State three different buses used in a computer system, describing what each is used for.**<br>• Data/carries the data/information/two way because direction carried not specified.<br>• Address/carries information about where the data is being sent to or collected from.<br>• Control/dictates whether the operation is read or write/carried to different parts of processor.<br>• Local/special bus to control flow of large amounts of data, e.g. to the disk drive.<br>[2 per bullet, max 3 bullets, max 6] | **[6]** |

| Question Number | Answer | Marks |
|---|---|---|
| **6(b)** **6(b)(i)** | **Two of the parts of a computer are the memory unit and the ALU.** **State two items that would be found in the memory unit.** <br>• Parts of O.S. in current use <br>• parts of application software in current use <br>• data files in current use. <br>[1 per bullet, max 2] | **[2]** |
| **6(b)(ii)** | **State two uses of the ALU.** <br>• To carry out arithmetic operations <br>• to carry out logical comparisons <br>• acts as a gateway to and from the processor. <br>[1 per bullet, max 2] | **[2]** |
| **6(b)(iii)** | **Describe two special registers, other than the ALU, which are found in the processor.** <br>• Program Counter (SCR) <br>• stores the address of the next instruction <br>• Memory Address Register <br>• stores the address in memory currently being accessed <br>• Memory Data Register (MDR) <br>• stores the data being transferred to or from memory <br>• Current Instruction Register <br>• stores the instruction currently being operated on <br>[1 per bullet, max 4] | **[4]** |
| **7(a)** | **Explain the meaning of the term transparency in a network operating system.** <br>• Actions which are taken by the O.S <br>• without the user being aware of them <br>• if the network is transparent then the user is unaware <br>• of being on a network terminal <br>• believing it to be a P.C./unaware of other users. <br>[1 per bullet, max 2] | **[2]** |

| Question Number | Answer | Marks |
|---|---|---|
| 7(b) | **Explain how printing is carried out by a network operating system when there is only one printer available.**<br><br>• May use a print server to control the operations<br>• jobs are sent to the print spooler<br>• which stores each job as a file<br>• and references to the file in a print queue<br>• when printer is free the next job referenced in the queue is sent to the printer from the file.<br><br>[1 per bullet, max 3] | **[3]** |
| 8 | **A business exists which specialises in supplying laptop computers to students. The business maintains a large customer base and carries out full servicing on the laptops. It carries a full stock of all the different types available.**<br>**The managing director, Karen, decides to computerise the administration of the business.** | |
| 8(a) | **State three different types of applications software which Karen may decide are necessary for running the business, saying what they would be used for.**<br><br>• Stock control –<br>• To ensure there is always stock available of different types<br>• Order processing –<br>• To ensure that orders are completed and that new stock arrives<br>• Payroll –<br>• To control the pay and tax of employees<br>• Word processor –<br>• letters to customers.<br>• Spreadsheet –<br>• accounts of the business.<br>• Desk Top Publishing –<br>• production of an instruction manual.<br>• Presentation software –<br>• to produce presentations to be used with groups.<br>• Web authoring –<br>• to produce a company website.<br>• Database –<br>• to store customer records.<br><br>[1 per bullet, max 6] | **[6]** |

| Question Number | Answer | Marks |
|---|---|---|
| **8(b)** | **The office staff will use a GUI interface, while the people who take orders over the telephone will use a form-based interface.** | |
| **8(b)(i)** | **Describe each of these interfaces.** | |
| | **GUI** | |
| | • Use of icons; | |
| | • use of windows or frames; | |
| | • use of pointers and menus. | |
| | [1 per bullet, max 2] | |
| | **Form-based** | |
| | • Computer outputs prompts; | |
| | • user responds; | |
| | • data proscribed and ordered. | |
| | [1 per bullet, max 2] | **[4]** |
| **8(b)(ii)** | **Explain why a forms interface is appropriate for use by workers taking orders over the telephone.** | |
| | • Prompts questions to ask customers; | |
| | • ensures no necessary information is missed; | |
| | • provides list of possible choices to some questions; | |
| | • allows for simplified validation process. | |
| | [1 per bullet, max 3] | **[3]** |
| | **Paper Total** | **[100]** |

**Assessment Objectives Grid (includes QWC)**

| Question | AO1 | AO2 | Total |
|----------|-----|-----|-------|
| 1 | 4 | | 4 |
| 2 | 9 | 4 | 13 |
| 3(a) | 3 | | 3 |
| 3(b) | 4 | 1 | 5 |
| 3(c) | 4 | 3 | 7 |
| 3(d) | 3 | 1 | 4 |
| 4(a) | 4 | 2 | 6 |
| 4(b) | 4 | 2 | 6 |
| 5(a) | | 4 | 4 |
| 5(b) | 2 | 4 | 6 |
| 5(c) | 6 | 2 | 8 |
| 5(d) | 2 | | 2 |
| 6(a) | 6 | | 6 |
| 6(b) | 8 | | 8 |
| 7(a) | 2 | | 2 |
| 7(b) | 3 | | 3 |
| 8(a) | 3 | 3 | 6 |
| 8(b) | 4 | 3 | 7 |
| Totals | 70 | 30 | 100 |