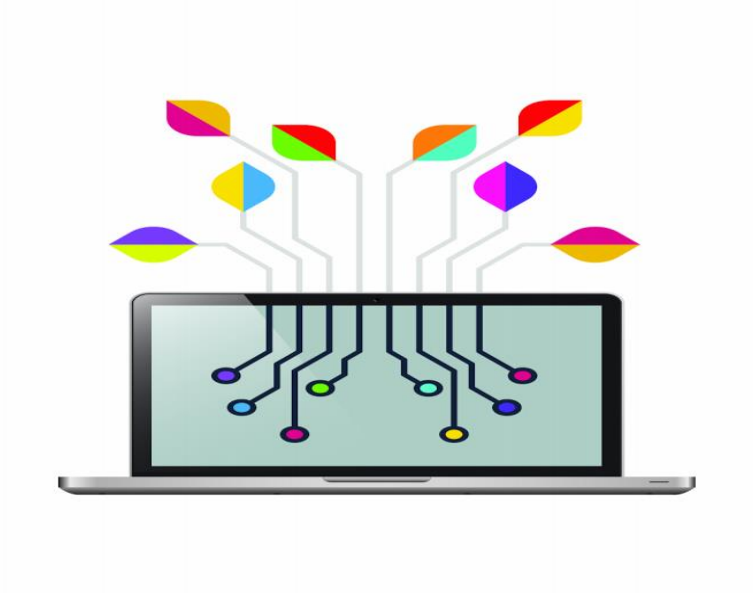
Mark Scheme (Results)

June 2018

BTEC Level National in Computing
Unit 1: Principles of Computer Science (31768H)



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Unit 1: Principle of Computer Science

General marking guidance

- All learners must receive the same treatment. Examiners must mark the first learner in exactly the same way as they mark the last.
- Marking grids should be applied positively. Learners must be rewarded for what they have shown they can do, rather than be penalised for omissions.
- Examiners should mark according to the marking grid, not according to their perception of where the grade boundaries may lie.
- All marks on the marking grid should be used appropriately.
- All the marks on the marking grid are designed to be awarded. Examiners should always award full marks if deserved. Examiners should also be prepared to award zero marks, if the learner's response is not rewardable according to the marking grid.
- Where judgement is required, a marking grid will provide the principles by which marks will be awarded.
- When examiners are in doubt regarding the application of the marking grid to a learner's response, a senior examiner should be consulted.

Specific marking guidance

The marking grids have been designed to assess learner work holistically.
Rows in the grids identify the assessment focus/outcome being targeted. When using a marking grid, the 'best fit' approach should be used.

- Examiners should first make a holistic judgement on which band most closely matches the learner's response and place it within that band. Learners will be placed in the band that best describes their answer.
- The mark awarded within the band will be decided based on the quality of the answer, in response to the assessment focus/outcome and will be modified according to how securely all bullet points are displayed at that band.
- Marks will be awarded towards the top or bottom of that band, depending on how they have evidenced each of the descriptor bullet points.

Question Number	Answer	Mark
1a	Award **1** mark for each of the following up to **two** marks: • (Event) Date • Bouncy Castle Type/design • (Additional) extras **Additional guidance:** For mark point 3 accept examples of additional extras as listed in Figure 1a of the information booklet.	2

Question Number	Answer	Mark
1b	Award **1** mark for each of the following up to **two** marks: • Find bouncy castles available • Calculate cost of additional extras • Calculate subtotal / castle cost + additional extras • Calculate VAT amount • Calculate total cost / subtotal + vat • Store customer order details (e.g. event date, type, extras) **Additional guidance:** Processes must be identified by a suitable verb or description e.g. find, search, calculate, store.	2

Question Number	Answer	Mark
1c	Description to include any **three** from: • Add comments (1) stating the purpose of statements/blocks (1) when needed (1) • Use indentation (1) to group statements and conditions (1) when using iteration/selection (1) • Separate/ split the code (1) into blocks (1) for different iterations / selection statements (1) **Additional guidance** Points and expansions can be combined from different mark points if correct	3

Question Number	Answer	Mark
1d	Explanation to include any **three** from: • Code is carrying out a presence check (1) • number of attempts that customers will need is not known (1) • code will not continue until the required data items are entered (1) • a while loop will loop until a condition is met / doesn't require the number of iterations to be specified (1) • a for loop requires the number of iterations required (1)	3

Question Number	Answer	Mark
1e	One mark for identifying of the correct protocol and one additional mark for each appropriate expansion up to a maximum of **4** marks. **Protocol:** • https / SSL (1) **Reason:** • encrypt data (1) • increases the security of data / creates a secure link (1) • transmitted from the customers web browser to the web server (1) • unreadable if accessed by an unauthorised person / without key (1) • can only be used after businesses have proved their identify / achieved an SSL certificate (1) • proves to customers that his website is genuine (1) • customers feel more confident (1) • data being entered is sensitive (1) **Additional guidance:** Allow examples of sensitive details e.g. name, credit card number, address.	4

Question Number	Answer	Mark
1f	Award **one** mark for line number identification and **one** additional mark for each appropriate expansion up to a maximum of **3** marks each. **ISSUE 1:** Line of Code: • Line 14 / Slide Castle (1) Correction: • Use the strong/emphasis tag (1) • to make the text stand out/emphasised (1) • Slide Castle (1) **ISSUE 2:** Line of Code: • Line 18/19 / £75.00 per day (1) Correction: • Use the list/ tag (1) • to add bullet points (to the text) (1) • £75.00 per day (1)	6

Question Number	Answer	Mark
2a	One mark for each of: **print(item[1][1])** 17 **print(item[2][4])** 15	2

Question Number	Answer	Mark
2b	Award **one** mark for identification and **one** additional mark for appropriate expansion up to **two** marks for each. • **Function name** (1) which will be used/called later in the code (1) • **Function Code/Body** (1) statements that define what the function does (1) • **Parameter (placeholder)** (1) for arguments/variables to be passed into the function (1) • **Data/Return type** (1) to define what the format of the value the function returns (1) **Allow:** 'return value' for return type	4

Question Number	Answer	Mark
2c	Explanation to include any **four** from: • a linear search will stop when it finds the first occurrence (1) • a linear search will output 13/the index/position of the first occurrence (1) • a linear search is unsuitable for finding repeated data / won't show a total number (1) • a count occurrences will examine the whole array (1) • a count occurrences will count the total number of times 13 appears (1) • a count occurrences will output the correct value (1)	4

Question Number	Answer	Mark
2d	Explanation to include any **three** from: • The result of the calculation/division may have decimal spaces (1) • to remove the numbers after the decimal space / any unnecessary values (1) • so results are whole numbers/integers (1) • the output is more readable/user friendly (1) • result is compatible with the array (1)	3

Question Number	Answer	Mark
2e	Description to include any **three** from: • Set-up array(s) (1) • accept user input(s) (1) • join the data entered with labels (1) • write (a single line) to a (text) file (1) • the array is updated (with temperature) (1)	4

Question Number	Answer	Mark
2f	A description to include any **three** different points that are relevant to improving the algorithm in figure 2. **Example responses:** • Declare variables (1) and define the associated data types (1) before assigning user inputs to the variables (1) • Add data validation (1) to the user inputs (1) such as adding a data type check (1) • Print the text file line to the screen (1) to allow the user to confirm if this is correct or not (1) before writing it to the text file (1) • Use a loop (1) to allow more than one day to be entered (1) rather than having to re-run the program (1) **Additional guidance** Accept any alternative responses that would improve the algorithm.	3

Question Number	Answer	Mark

3a	**Example Solution:**
	
	BEGIN
	
	wrong = [ ]
	
	INPUT regNumber
	
	INPUT current ("yes" or "no")
	
	INPUT registrationYear
	
	IF current = "yes" **AND** registrationYear >=2001 **THEN**
	  IF regNumber[0] or regNumber[1] = "I" **OR** "Q" **OR** "Z" **THEN**
	  Add index to wrong
	  ENDIF
	  IF regNumber[2] **OR** regNumber[3] is **NOT BETWEEN** 0 AND 9 **THEN**
	  Add index to wrong
	  ENDIF
	  IF regNumber[4] = **NOT** " " **THEN**
	  Add index to wrong
	  ENDIF
	  IF regNumber[5] **OR** regNumber[6] **OR** regNumber[7] = "I" **OR** "Q" **THEN**
	  Add index to wrong
	  ENDIF
	ELSE:
	  DO NOTHING
	ENDIF
	
	IF wrong = "":
	  PRINT "Registration Completed"
	
	ELSE:
	  PRINT "The following digits are incorrect"
	  PRINT wrong
	ENDIF
	
	END
	
	Additional guidance:
	Credit alternative solutions that use correct logic and would produce the expected outcome.
		8

	Mark scheme (award up to 8 marks)	
Level	Mark	Descriptor
Level 0	0	No rewardable material.
1	1-3	Structure of the algorithm uses some appropriate hierarchies/subdivision but clarity and/or readability is limited. Variable/object/process names are inappropriate and/or inconsistent Logical operations and sequence/structure of processes used with limited accuracy. There is limited use of accepted conventions A limited or highly inefficient solution.
2	4-6	Structure of the algorithm uses mostly appropriate hierarchies/subdivision to provide some clarity and readability. Variable/object/process names are mostly appropriate but there is some inconsistency

		Logical operations and sequences/structure of processes used with some accuracy. Accepted conventions have been applied but there are some inconsistencies. A solution that meets most of the requirements with some inefficiencies.
3	7-8	Structure of the algorithm uses appropriate and consistent hierarchies/subdivision providing clarity and readability. Variable/object/process names are appropriate and used consistently Logical operations and sequences/structures of processes are mostly accurate. Accepted conventions have been used consistently. A solution that meets the requirements with minor inaccuracies/inefficiencies.

Question Number	Answer	Mark
3b	**Possible Answers:** **Customer Name:** • There is very limited use of data validation on the customer name. • The validation rule setup will check the name as a whole. It would be better to enter the first name and surname separately so that each could be validated separately. • The code on lines 6 and 7 will attempt to ensure that the length is more sensible as the code will repeatedly ask the user to enter their name until at least 2 characters are entered. This is good practice because it will ensure that the user doesn't accidently leave this blank. However this still does not ensure that the name is entered correctly. • The programmer has anticipated that the user may enter their name with or without capital letters. The code on line 4 .capitalize() will therefore put the name in lowercase with a capital letter. • There are no further checks carried out on the customer name. The programming code makes no use of data type checks and therefore this could lead to the user entering other characters such as numbers, punctuation or symbols. **Telephone Number:** • The programming code line 17 .isdigit() checks to ensure that every digit that has been entered is a number. • The while loop will repeatedly ask the user to user to enter the telephone number until this rule has been met. This is good practice because it will stop the user entering letters, symbols and punctuation marks, however some users may enter want to enter the area code in brackets. • The programmer has anticipated that the user may enter spaces and therefore entered code on line 17 replace(" ", "") to take these out of the telephone number to make the validation more accurate. • A length check has been setup and the code will repeatedly ask the user to enter their telephone number until the length of the telephone number is between 6 and 11 numbers long. This is good	8

	practice because it will ensure that he doesn't accidently leave this blank. **Conclusion:** Although the code demands that a name must be entered there are no checks on the type of data entered which therefore increases the likelihood of mistakes data being entered. The validation rules setup on the telephone number are more effective as more checks are carried out. However it is worth noting that no validation rules can ensure that the data entered is accurate. It can only check it is reasonable and within the boundaries set within the code.	

Mark scheme (award up to 8 marks)

Level	Mark	Descriptor
0	0	No rewardable material
1	1-3	Technical vocabulary is used but is not used appropriately to support arguments in relation to the issues of the question. Few of the points made will be relevant to the context in the question. Limited evaluation which contains generic assertions leading to a conclusion (if present) that is superficial or unsupported
2	4-6	Accurate technical vocabulary is used to support arguments but not all are relevant to the issues of the question Some of the points made will be relevant to the context in the question, but the link will not always be clear. Displays a partially developed evaluation which considers some different competing points, although not always in detail, leading to a conclusion which is partially supported.
3	7-8	Fluent and accurate technical vocabulary is used to support arguments that are relevant to the issues of the question Most of the points made will be relevant to the context in the question, and there will be clear links Displays a well-developed and logical evaluation which clearly considers different aspects and competing points in detail, leading to a conclusion that is fully supported.

Question Number	Answer	Mark
3c	**Possible Answers:** **General:** • Edward could remove the lists from the programming code and store these in a separate file. • Examples including storing data in a database, CSV, text file or another programming file. • These will then allow him to edit these in a separate file without the possibility of accidently altering the code. • By storing the data away from the code, it therefore means that once the programming code has been setup and tested, the user will therefore not need to edit this and they can edit the external file alone. **External Database:** • Edward could setup a database such as a flat-file or relational database and store a list of possible faults the user may enter in tables. • He could then setup programming code to write scripts, procedures or queries that will then search the main database and then pull the data from there. Examples of this include My Sequel or Postgres. • However, this solution would involve the code needing to be rewritten and more specialist programming knowledge will be required. • If a database is used, it would allow the user to easily add/edit the data as this would be put into tables. • Therefore there would be no requirement for the user to ensure the data is laid out in a certain way. **Text/CSV Files:** • Although the programming code already makes use of text files in append mode, these are used to log the problem. • Edward could setup additional text file for each department and then enter a list of possible faults in each text file. • This solution would be the easiest because he could remove the lists from the programming code and add these into separate text/CSV files. He could then add extra lines of code to	8

	the current programming code in read mode to read to read from them. • One problem with this method is that the user would be required to ensure the files are laid out correctly. For example the user may need to use commas or returns and if these are not use correctly then the programming code may not work. **Additional Programming Files:** • Edward could setup a function in a new programming file and then move the lists that he has already created into this function. • He could then import this function into his programming code so that his code can read from the lists. Therefore any changes that need to be made to the lists only need to be made in the external function and not the actual programming code. • One problem with this method is that the user would be required to ensure the lists are laid out correctly otherwise the programming code may not work. **Accept other suitable suggestions.**	

Mark scheme (award up to 8 marks)		
Level	Mark	Descriptor
Level 0	0	No rewardable material.
1	1-3	Demonstrates isolated elements of knowledge and understanding, there will be major gaps or omissions Few of the points made will be relevant to the context in the question Limited discussion which contains generic assertions rather than considering different aspects and the relationship between them
2	4-6	Demonstrates some accurate knowledge and understanding, with only minor gaps or omissions Some of the points made will be relevant to the context in the question, but the link will not always be clear Displays a partially developed discussion which considers some different aspects and some consideration of how they interrelate, but not always in a sustained way
3	7-8	Demonstrates mostly accurate and detailed knowledge and understanding Most of the points made will be relevant to the context in the question, and there will be clear links

		Displays a well-developed and logical discussion which clearly considers a range of different aspects and considers how they interrelate, in a sustained way

Question Number	Answer	Mark
4a	Award **one** mark for a suitable logical check that uses a Boolean operator and **one** additional mark for an appropriate action/output such as: **AND:** If an arrow key is pressed AND the lives are greater than 0 (1) the character moves (1) If the score is equal to 10 AND lever is on (1) the level criteria has been met(1) **OR:** If Character collides with the Monster OR the Fire (1) then deduct 5 from the health (1) **NOT:** If the lives is not equal to 0 (1) the game will continue (1) If the Character is not touching the wall (1) the character will move. **Accept other suitable suggestions.**	6

Question Number	Answer	Mark
4b	**Possible Answers:** **<u>Expansion:</u>** • Kisha may want to expand her game/programming code and the features/tools currently available may not meet her new requirements which could prevent her competing with other game providers. **<u>Support:</u>** • The support for her current programming language may end and so therefore the provider may stop releasing updates which could increase security threats for the people that are buying/playing the game. • Other programming languages may be used by a bigger community and therefore there will be more support available in terms of tutorials, online forums etc to allow Kisha to get support with implementing new ideas in her game. **<u>Changes in Hardware/Software:</u>** • Changes in hardware may mean that the code needs to be translated to support the requirements of the new hardware so that Kisha could reach a bigger market audience. • Changes to delivery platform e.g. providing web-based, mobile version of the game • Changes in operating system may mean that the code needs to be translated to be compatible with varying operating systems to ensure the game continues to work **<u>Performance:</u>** • Another programming language may have better built in functions which can reduce the amount of programing code which can therefore make the game run more efficiently to enhance the gaming experience.	8

	• Newer programming languages may offer better tools / features that will increase the functionality of the game to enhance its performance to keep the game up-to-date with current gaming techniques used by other game providers.	

Mark scheme (award up to 8 marks)

Level	Mark	Descriptor
Level 0	0	No rewardable material.
1	1-3	Demonstrates isolated elements of knowledge and understanding, there will be major gaps or omissions Few of the points made will be relevant to the context in the question Limited discussion which contains generic assertions rather than considering different aspects and the relationship between them
2	4-6	Demonstrates some accurate knowledge and understanding, with only minor gaps or omissions Some of the points made will be relevant to the context in the question, but the link will not always be clear Displays a partially developed discussion which considers some different aspects and some consideration of how they interrelate, but not always in a sustained way
3	7-8	Demonstrates mostly accurate and detailed knowledge and understanding Most of the points made will be relevant to the context in the question, and there will be clear links Displays a well-developed and logical discussion which clearly considers a range of different aspects and considers how they interrelate, in a sustained way

Question Number	Answer	Mark
4c	**Possible Answers:** **<u>Classes:</u>** • Kisha can use classes for the different parts of the game such as levels, backgrounds, sounds and sprites. • Each class would define what the object in the class will look like (its properties) and what it can do (its methods). For example you could setup a character sprite class and define the properties of this. When the classes are setup, instances of the class can be used multiple times. • Classes can be saved to a library and then reused in other levels. This will lead to faster program development. **<u>Objects:</u>** • An object is what is created in your code based on the class. Therefore when Kisha has setup the classes, they can then be used in the programming code several times. You can then call classes by their name and then assign them to a variable. **<u>Encapsulation/Data Hiding</u>** • As the game expands it may get more difficult for Kisha to keep track of the different elements. If for example the same features are used on all levels such as the lives/health, it can be difficult to know when or where these are changing. If the properties of these change then Kisha would have to search through all of the code to find where they exist. • Therefore encapsulation will allow all of the properties to be directly inaccessible. Instead of accessing the different properties directly, Kisha can create functions that sit between the properties and the code. Therefore if you want to change the properties then Kisha would need request it via the function. These functions are commonly known as getters and setters. • This will make different areas private and inaccessible inside a class. This means that properties are hidden from the rest of the code. It means that it cannot be accessed by other parts of the code. This means that if Kisha makes changes are made later on you only need to change the one function. **<u>Inheritance / Reusability:</u>** • Some classes may have the same properties. Therefore in order to reduce the amount of duplication and rewriting of the same code, Kisha can make use of inheritance. • The functions and properties can be outlined in the parent class and therefore these same	12

	functions and properties don't need to be included in the child classes. Therefore only the properties that are unique to that class will need to be added. • By doing this, it will reduce the amount of code that Kisha will need to write. As she adds additional levels, the amount of code will expand and therefore this will allow her to improve the efficiency of the program but also reduces the amount of errors that will have to debug. **Polymorphism:** • This will allow Kisha to add extra functionality to the game that does not exist in the parent class. As the game progresses onto different levels, Kisha may was to use the same blocks of code however add additional functionality to make the game more challenging. **Overloading:** • This will allow Kisha to have two or more methods in the same class with the same name. However each must have different signatures such as the parameters and she can then overwrite the properties that she wants to change changed.	

Mark scheme (award up to 12 marks)		
Level	Mark	Descriptor
Level 0	0	No rewardable material.
1	1-4	Demonstrates isolated knowledge and understanding, there will be major gaps or omissions Breaks the situation down into component parts and a few of the points made will be relevant to the context in the question Limited analysis which contains generic assertions rather than interrelationships or linkages
2	5-8	Demonstrates some accurate knowledge and understanding, with few minor omissions/any gaps or omissions are minor Breaks the situation down into component parts and some of the points made will be relevant to the context in the question Displays a partially developed analysis which considers some interrelationships or linkages but not always sustained.
3	9-12	Demonstrates mostly accurate and thorough/detailed knowledge and understanding Breaks the situation down into component parts and most of the points made will be relevant to the context in the question Displays a well-developed and logical analysis which clearly considers interrelationships or linkages in a sustained manner

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