

Wednesday 8 June 2016 – Morning

GCSE COMPUTING

A451/01 Computer Systems and Programming

Candidates answer on the Question Paper.

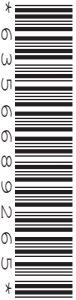
OCR supplied materials:

None

Other materials required:

- Calculators are allowed in this exam

Duration: 1 hour 30 minutes



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **80**.
- The Quality of Written Communication is assessed in questions marked with an asterisk (*).
- This document consists of **16** pages. Any blank pages are indicated.

Answer **all** the questions.

1 The character é is part of a computer’s character set.

(a) Describe what is meant by a character set.

.....
..... [1]

When sending text messages using a mobile phone, people can choose from hundreds of characters, called emoji, to insert in their message. An example of an emoji is 🙈.

The Unicode character code for the emoji 🙈 in hexadecimal is 1F64A.

(b) (i) Convert the hexadecimal number 1F64A to binary.
The first three hexadecimal digits have been done for you.

Hexadecimal:	1	F	6	4	A
Binary:	0001	1111	0110

[2]

(ii) Explain why mobile phones that can send emoji would use Unicode instead of ASCII as their character set.

.....
.....
.....
..... [2]

3 Charlotte runs a website which stores details about movies. The users can log onto the website and leave ratings for movies.

The websites uses a database with three tables:

- The table `FILM` contains the following fields; `FilmID`, `Title`, `Year`, `Director`, `Category`
- The table `USER` contains the following fields; `UserID`, `FirstName`, `Surname`, `DateOfBirth`
- The table `RATING` stores, amongst other fields, the rating a user has given a film (a score out of 5).

An extract of the data in the table `RATING` is shown in Fig. 1:

RatingID	FilmID	UserID	Rating
00214	16CM12	20_Elliot	4.5
00215	55HR8	Jade01	1
00216	12HR15	Sunil_99	1
00217	16SF8	Jade01	2

Fig. 1

(a) Explain why `FilmID` has been included in the `RATING` table.

.....

.....

.....

.....

.....

..... [3]

(b) Explain why it is a good idea to separate the data from the applications that use the database.

.....

.....

.....

..... [2]

(c) Give **one** example of a record that could be stored in the user table.

.....
..... [1]

(d) (i) Charlotte uses a query to list films. The query uses the following criteria:

```
(Rating < 2) AND (UserID = "Jade01")
```

List the RatingID(s) of the rating(s) that will be selected from the extract shown.

.....
..... [1]

(ii) Write the criteria for a query that will select all Films produced in the Year 2015 in the Category "Comedy".

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

- 4 Joseph is an author and programmer, and he needs to estimate how many pages his new book will have.

Each page has an average of 300 words. Each chapter starts with a chapter title page. The number of pages is estimated by;

- dividing the number of words by 300
- ignoring the decimal part of the division
- adding the number of chapters to this total.

Joseph uses the algorithm below to estimate the number of pages, but his algorithm does not give the correct result.

```
01 INPUT numberOfWords
02 INPUT numberOfChapters
03 CONST wordsPerPage = 300
04 numberOfPages = RoundDown(numberOfWords / wordsPerPage)
05 numberOfPages = numberOfWords + numberOfChapters
06 OUTPUT numberOfPages
```

Joseph has used a `RoundDown` function to remove the decimal part of the division, e.g. `RoundDown(6.2)` would return 6, `RoundDown(7.8)` would return 7.

- (a) State whether this algorithm uses selection, sequence or iteration.

..... [1]

- (b) Line 03 defines a constant. Describe what is meant by a constant.

.....

 [2]

- (c) There is an error in line 05 of the algorithm.

Write a corrected line of code to replace line 05.

..... [1]

- (d) Identify the most appropriate data type for the following variable `numberOfWords`. Give a reason for your choice.

Data type

Reason

[2]

- (e) Joseph is changing his algorithm and needs to store the name and price of his book in new variables. State the most appropriate data type(s) for these variables.

Name

Price

[2]

Joseph is using an Integrated Development Environment (IDE) to produce the program.

- (f) One tool in an IDE that Joseph uses is a translator.

Describe **two** additional tools in an IDE that Joseph could use to help him produce his program.

Tool 1 name:

Tool 1 description:

.....

Tool 2 name:

Tool 2 description:

.....

[4]

- (g) Joseph's IDE allows him to use both a compiler and an interpreter.

Describe how Joseph could make use of a compiler and an interpreter when producing his program.

Compiler:

.....

.....

.....

Interpreter:

.....

.....

.....

[4]

- 5 Alex is producing images and sound effects for a website.
Part of a bitmap image is shown in Fig. 2:

W	W	R	R	R	B	B
W	W	R	Y	R	B	B
B	B	R	R	R	B	B
B	B	B	LG	B	DG	B
B	DG	DG	LG	DG	B	B
B	B	DG	LG	B	B	B
B	B	B	LG	B	B	B

Fig. 2

The letters represent a colour, as shown in Fig. 3:

Letter	Colour
W	White
B	Blue
R	Red
Y	Yellow
DG	Dark Green
LG	Light Green

Fig. 3

- (a) Using the example in Fig. 2, explain how a bitmap image is stored on a computer.

.....

.....

.....

.....

.....

.....

.....

..... [3]

(b) Explain how reducing the number of colours in an image can reduce its file size.

.....
.....
.....
..... [2]

(c) The final image file may contain metadata. Describe, using an example, what is meant by metadata.

.....
.....
.....
..... [2]

(d) Alex needs to create an audio recording of himself playing his guitar.

(i) Explain how sampling is used to make the recording.

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

(ii) State the effects of increasing the sample rate of the recording.

.....
.....
.....
..... [2]

6 Quinn’s current computer specification is shown in Fig. 4.

1.5 GHz Dual Core Processor
1GB RAM
100GB Hard Drive
64KB Cache
Touchscreen
Integrated camera and speakers
2 × USB 3.0 ports
2 × USB 2.0 ports
Blu-ray drive
2GB Graphics Card

Fig. 4

(a) Describe the benefits of a dual core processor over a single core processor.

.....

.....

.....

..... [2]

(b) Quinn is considering upgrading the RAM.

(i) Describe **two** differences between RAM and ROM.

Difference 1

.....

.....

Difference 2

.....

..... [4]

(ii) Quinn has decided to upgrade the RAM on his computer. Explain why this would improve the computer’s performance.

.....

.....

.....

..... [2]

7 A company, OCR Supermarkets, has supermarket stores throughout the country. The computers for each store connect to the central office using a Wide Area Network (WAN).

(a) Identify **two** differences between a WAN and a LAN (Local Area Network).

Difference 1:

.....

Difference 2:

.....

.....

[2]

(b) OCR Supermarkets use a client-server network to connect the checkout computers to the store's server.

Describe **two** benefits to OCR Supermarkets of using a client-server network instead of a peer-to-peer network.

Benefit 1:

.....

.....

Benefit 2:

.....

.....

[4]

The supermarket manager's computer can access the Internet and the World Wide Web.

(c) Explain the difference between the Internet and the World Wide Web.

.....

.....

.....

.....

[2]

- 8 (a) Convert the decimal number 191 into 8-bit binary.

..... [1]

- (b) Perform the following binary addition

$$\begin{array}{r} 01101011 \\ + 01011011 \\ \hline \end{array}$$

[2]

- 9 A memory game is played where:
- three players (A, B and C) have to choose a number between 0 and 100
 - if the number has already been chosen, a message is displayed that says "taken"
 - if the number has not already been chosen, the player's letter is placed next to it
 - the quantity of numbers that have not yet been chosen is displayed.

The winner is the player who has chosen the most unique numbers by the end of the game.

The numbers are stored in an array; `numbers()`. A number that has not yet been chosen is stored as an empty string "". The players are represented by "A", "B" and "C".

Fig. 5 shows an extract from the array:

Number:	0	1	2	3	4	99	100
Player:	A	C	B		A			B	

Fig. 5

You have been asked to program part of the game.

Write an algorithm for player A's turn, which;

- takes as an input the number that player A chooses
- if it has not already been chosen, stores an "A" in that array element
- if it has already been chosen, outputs "taken"
- counts and outputs the quantity of numbers left that have not been chosen. **[6]**

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