

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
AS LEVEL  
H046/01  
COMPUTER SCIENCE  
Computing Principles  
MONDAY 6 JUNE 2016: Morning  
TIME ALLOWED: 1 hour 15 minutes  
plus your additional time allowance  
MODIFIED ENLARGED 24pt**

<b>First name</b>		<b>Last name</b>	
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<b>Centre number</b>						<b>Candidate number</b>				
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**DO NOT USE:  
A calculator**

**READ INSTRUCTIONS OVERLEAF**

VI\_7143711334/FP



## **INSTRUCTIONS**

**Use black ink.**

**Complete the boxes on the first page with your name, centre number and candidate number.**

**Answer ALL the questions.**

**Write your answer to each question in the space provided.**

**If additional space is required, use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.**

## **INFORMATION**

**The total mark for this paper is 70.**

**The marks for each question are shown in brackets [ ].**

**Quality of extended responses will be assessed in questions marked with an asterisk (\*).**

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**Answer ALL the questions**

- 1 See And Believe is a company that specialises in computer-generated imagery (CGI) for films.**

**Producing CGI requires lots of processing power and so the company has a large number of high-performance computers.**

- (a) Explain why See And Believe would use a distributed operating system.**

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**[3]**

**(b) The processors in the company's powerful computers have fast clock speeds and large amounts of cache memory. Describe how each of these improves the processor's performance:**

**(i) fast clock speed**

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**[2]**

**(ii) large cache memory**

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**[2]**



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**(c) Elegant Bags prides itself on its ethical reputation.**

**(i) State ONE ethical issue the company may have considered when designing its website.**

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**[1]**

**(ii) State ONE action the company could take to address the ethical issue identified in part (i).**

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**[1]**

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**3 A burglar alarm runs on a processor with the Little Man Computer (LMC) instruction set.**

**One of the instructions in the set is Branch if Positive (BRP).**

**(a) Describe what the instruction BRP does.**

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**[2]**



**4 A programmer spends her spare time contributing to an open source application that converts video files from a range of formats to one which uses lossy compression.**

**(a) Describe what is meant by the term ‘open source software’.**

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**[2]**

**(b) Describe what is meant by the term ‘lossy compression’.**

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**[2]**

**When a video is selected, the program gives an estimate of the file size of the converted video.**

**The estimate in kilobytes is calculated by multiplying:**

**the number of pixels in the video's resolution by...**

**the number of frames per second by...**

**the length of the video in minutes by...**

**the value 0.0013.**

**(c) Write a function in pseudocode that estimates the size of a converted video.**

**It should:**

**take in 3 parameters: `pixels`, `framesPerSec`,  
`lengthMins`**

**calculate the estimated file size**

**return a string with the file size, including units**

**use megabytes for sizes under 1000 megabytes,  
otherwise the estimate should be given in gigabytes.**

**Examples:**

**480000 pixels at 24 frames per second for 60 minutes will  
return a size of 898.56 MB**

**480000 pixels at 24 frames per second for 120 minutes  
will return a size of 1.797 GB. [4]**







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**5 (a) Give the number 55 in binary as an 8-bit unsigned integer.**

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[2]

**(b) Represent the number 55 in normalised floating point binary notation, using 8 bits for the mantissa followed by 8 bits for the exponent, both in two's complement binary.**

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[2]

**(c) Represent the number 55 in normalised floating point binary notation, with the mantissa and exponent both in two's complement binary, using as few bits as possible.**

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[2]

**(d) State why a programmer might choose to declare a variable as a floating point number.**

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**[1]**

**6 An insurance company's offices have a large number of black and white printers.**

The company's technicians keep accurate records of the printers in the building, and the quantity of toner cartridges in stock, in a flat file database. An extract of the database is shown in Fig. 1.

**Fig. 1**

<b>PRINTER MODEL</b>	<b>LOCATION</b>	<b>NOTES</b>	<b>CARTRIDGE CODE</b>	<b>QUANTITY IN STOCK</b>	<b>RE-ORDER URL</b>
LasPrint LP753	office 3		LP-7XB	12	www.megacheapprint.com/toner/LP-7XB
LasPrint LP710	office 6	drum replaced	LP-7XB	12	www.megacheapprint.com/toner/LP-7XB
Zodiac ZN217	reception		Zod17	4	www.zodiaclaserprinting.com/shop/Z17
Zodiac ZN217	conference Room 2	had to add RAM	Zod17	4	www.megacheapprint.com/toner/LP-7XB
LasPrint LP753	office 8		LP-7XB	12	www.megacheapprint.com/toner/LP-7XB

**(a) Describe TWO issues, referring to Fig. 1, that might arise from using a flat file database structure.**

**1** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**2** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**[4]**

**A relational database is created with three tables:**

**PrinterModel: this stores all the data about each model of printer**

**PrinterInstance: this stores the data about each individual printer in the building**

**Cartridge: this stores information about the toner cartridges.**

**(b) Draw an entity-relationship diagram to show the relationships between the three tables.**

**[4]**

**Most of the printers have their own on-board RAM.**

**(c) State what the printers' RAM is used for.**

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**[1]**

- 7 A DIY store has an offer: ‘Spend £20 or more on decorating products and get 10% off all gardening products.’

When items are scanned in at the checkout they are stored in a 2-dimensional array called `purchases`, which stores the item name, category and price.

A receipt with the appropriate discounts deducted is then produced.

Examples of the array and corresponding receipt are shown in Fig. 2 and Fig. 3.

Fig. 2

<b>Matt Pink Paint</b>	<b>Decorating</b>	<b>6.99</b>
<b>Floral Wallpaper</b>	<b>Decorating</b>	<b>7.99</b>
<b>Magnolia Gloss Paint</b>	<b>Decorating</b>	<b>5.49</b>
<b>Weed Killer</b>	<b>Gardening</b>	<b>2.99</b>
<b>Picture Frame</b>	<b>Decorating</b>	<b>8.99</b>
<b>Plug Socket</b>	<b>Electrics</b>	<b>6.99</b>
<b>Doorbell</b>	<b>Electrics</b>	<b>15.99</b>
<b>Matt White Paint</b>	<b>Decorating</b>	<b>4.99</b>
<b>Tiles</b>	<b>Decorating</b>	<b>19.99</b>
<b>Grass Seed</b>	<b>Gardening</b>	<b>1.99</b>
<b>Lawn Mower</b>	<b>Gardening</b>	<b>129.99</b>

**Fig. 3**

```
Matt Pink Paint £6.99
Floral Wallpaper £7.99
Magnolia Gloss Paint £5.49
Weed Killer £2.99
-£0.30 discount
Picture Frame £8.99
Plug Socket £6.99
Doorbell £15.99
Matt White Paint £4.99
Tiles £19.99
Grass Seed £1.99
-£0.20 discount
Lawn Mower £129.99
-£13.00 discount
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TOTAL: £198.89
```

**Write an algorithm in pseudocode, using the array purchases, to:**

**determine which items are given a discount**

**calculate the total price to pay**

**present this information on a receipt in the format shown in Fig. 3.**

**[6]**

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