

QUESTION 1.



7 A system is monitored using sensors. The sensors output binary values corresponding to the following conditions, as shown in the table:

Parameter	Description of parameter	Binary value	Description of condition
P	oil pressure	1	pressure \geq 3 bar
		0	pressure $<$ 3 bar
T	temperature	1	temperature \geq 200°C
		0	temperature $<$ 200°C
R	rotation	1	rotation \leq 1000 revs per minute (rpm)
		0	rotation $>$ 1000 revs per minute (rpm)

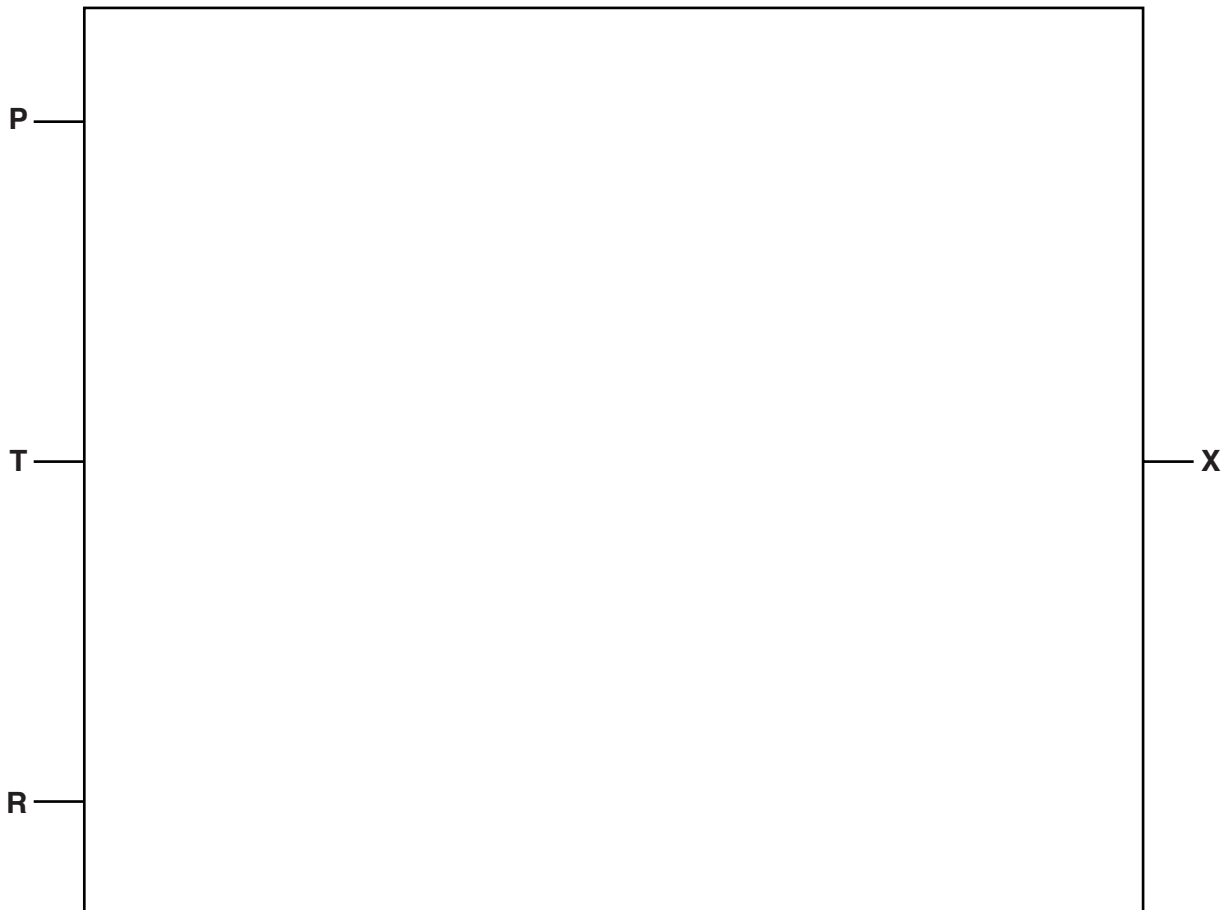
The outputs of the sensors form the inputs to a logic circuit. The output from the circuit, X, is 1 if any of the following three conditions occur:

either oil pressure \geq 3 bar **and** temperature \geq 200°C

or oil pressure $<$ 3 bar **and** rotation $>$ 1000 rpm

or temperature \geq 200°C **and** rotation $>$ 1000 rpm

(a) Draw a logic circuit to represent the above system.



(b) Complete the truth table for this system.

P	T	R	Workspace	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]



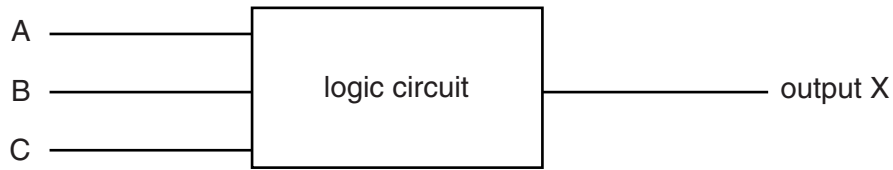
QUESTION 2.

10



- 6 (a) Three digital sensors A, B and C are used to monitor a process. The outputs of the sensors are used as the inputs to a logic circuit.

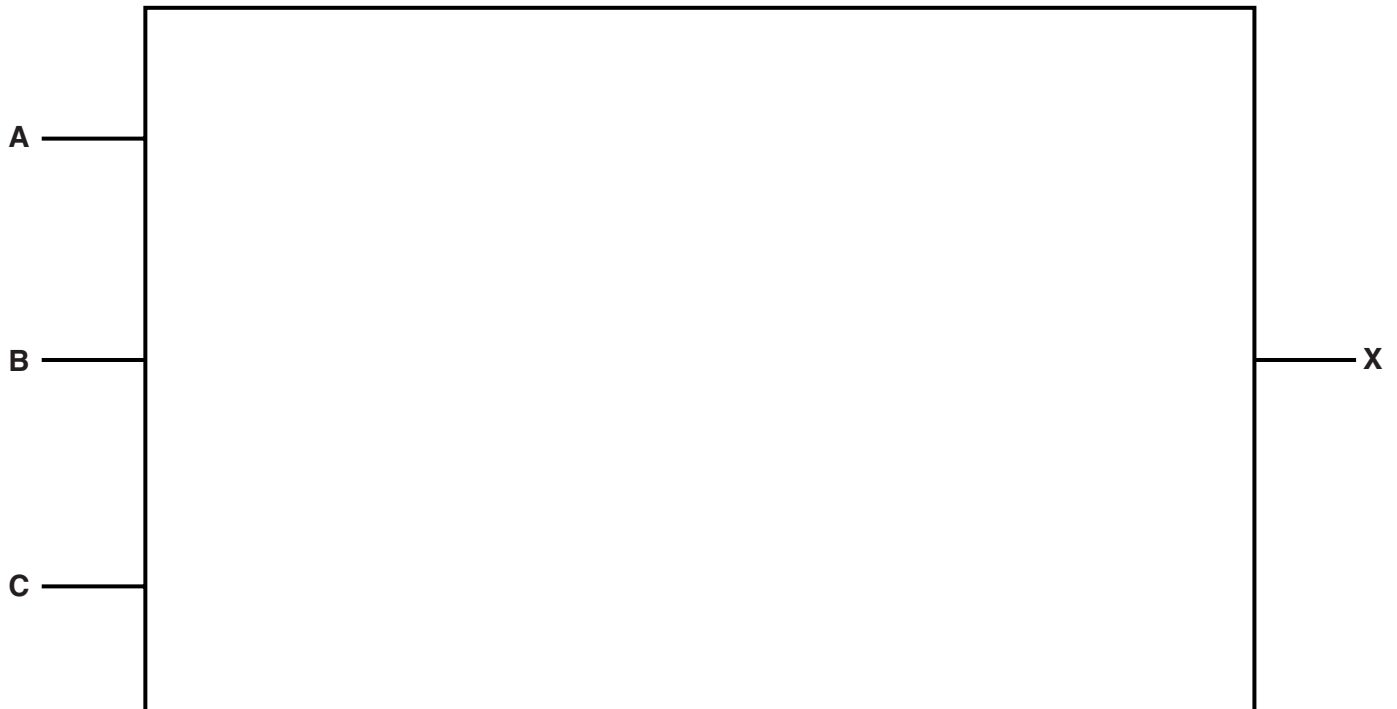
A signal, X, is output from the logic circuit:



Output, X, has a value of 1 if either of the following two conditions occur:

- sensor A outputs the value 1 OR sensor B outputs the value 0
- sensor B outputs the value 1 AND sensor C outputs the value 0

Draw a logic circuit to represent these conditions.



[5]

(b) Complete the truth table for the logic circuit described in part (a).

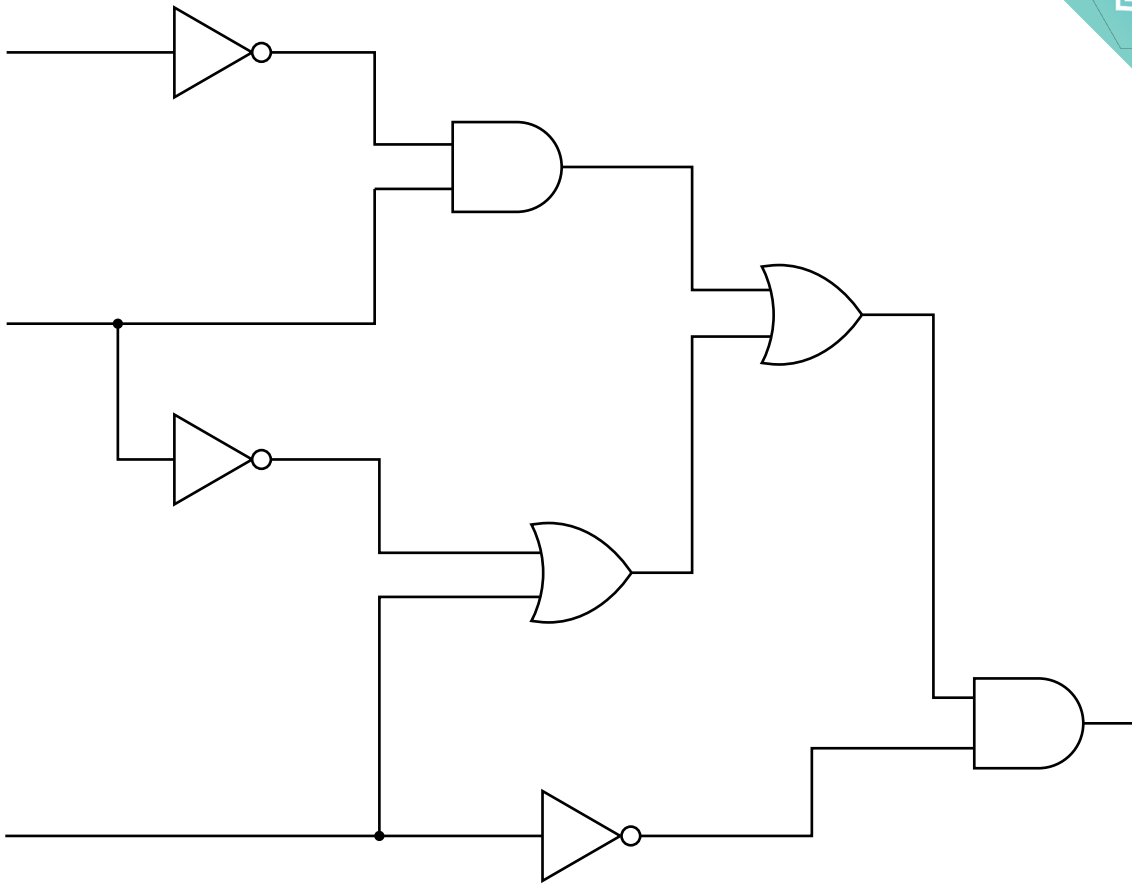
A	B	C	Working Space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]





(c) Write a logic statement that describes the following logic circuit.



.....

.....

.....

..... [3]



Question 7 begins on page 14.

QUESTION 3.



Cambridge
International
AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE
NAME

CENTRE
NUMBER

--	--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--	--



COMPUTER SCIENCE

9608/11

Paper 1 Theory Fundamentals

October/November 2015

1 hour 30 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

Answer **all** questions.

No marks will be awarded for using brand names of software packages or hardware.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The maximum number of marks is 75.

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

QUESTION 4.

Cambridge
International
AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level



CANDIDATE
NAME

CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--

COMPUTER SCIENCE

9608/11

Paper 1 Theory Fundamentals

May/June 2016

1 hour 30 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

Answer **all** questions.

No marks will be awarded for using brand names of software packages or hardware.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The maximum number of marks is 75.

This document consists of **15** printed pages and **1** blank page.



- 1 Three examples of language translators and four definitions are shown below.

Draw lines to link each language translator to the correct one or more definitions.

Language translator

Definition

Compiler

The software reads the source code and reports all errors. The software produces an executable file.

Assembler

The software reads each statement and checks it before running it. The software halts when it encounters a syntax error.

Interpreter

The software translates a high-level language program into machine code for the processor to execute.

The software translates low-level statements into machine code for the processor to execute.

QUESTION 5.



Cambridge
International
AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE
NAME

CENTRE
NUMBER

--	--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--	--



COMPUTER SCIENCE

Paper 1 Theory Fundamentals

9608/13

May/June 2016

1 hour 30 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

Answer **all** questions.

No marks will be awarded for using brand names of software packages or hardware.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The maximum number of marks is 75.

This document consists of **13** printed pages and **3** blank pages.

2

1 Describe **two** differences between a compiler and interpreter.

1

.....

.....

.....

.....

2

.....

.....



QUESTION 6.



- 5 A motor is controlled by a logic circuit. The circuit has inputs (0 or 1) from R, T and W. The motor is switched off when the output from the logic circuit is 1.

The following table shows the three sensors and the conditions being monitored.

Sensor	Description	Binary value	Condition
R	rotation	0	rotation < 4000 rpm
		1	rotation \geq 4000 rpm
T	temperature	0	temperature \geq 90 °C
		1	temperature < 90 °C
W	water flow rate	0	water flow rate \geq 50 litre/min
		1	water flow rate < 50 litre/min

The output, X, is 1 if:

temperature \geq 90 °C and rotation \geq 4000 rpm

or

temperature < 90 °C and water flow rate \geq 50 litre/min

- (i) Draw a corresponding logic circuit.





(ii) Give a logic statement corresponding to the logic circuit in part (i).

.....

.....

(iii) Complete the truth table for this system.

INPUT			Workspace	OUTPUT
R	T	W		X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

QUESTION 7.

4



- 1 (a) A student writes the following logic expression:

$X \text{ is } 1 \text{ IF } (B \text{ is NOT } 1 \text{ AND } S \text{ is NOT } 1) \text{ OR } (P \text{ is NOT } 1 \text{ AND } S \text{ is } 1)$

Draw a logic circuit to represent this logic expression.

Do not attempt to simplify the logic expression.



[6]

- (b) Complete the truth table for the logic expression given in **part (a)**.

B	S	P	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]

QUESTION 8.



- 5 A motor is controlled by a logic circuit. The circuit has inputs (0 or 1) from R, T and W. The motor is switched off when the output from the logic circuit is 1.

The following table shows the three sensors and the conditions being monitored.

Sensor	Description	Binary value	Condition
R	rotation	0	rotation < 4000 rpm
		1	rotation \geq 4000 rpm
T	temperature	0	temperature \geq 90 °C
		1	temperature < 90 °C
W	water flow rate	0	water flow rate \geq 50 litre/min
		1	water flow rate < 50 litre/min

The output, X, is 1 if:

temperature \geq 90 °C and rotation \geq 4000 rpm

or

temperature < 90 °C and water flow rate \geq 50 litre/min

- (i) Draw a corresponding logic circuit.





(ii) Give a logic statement corresponding to the logic circuit in part (i).

.....

.....

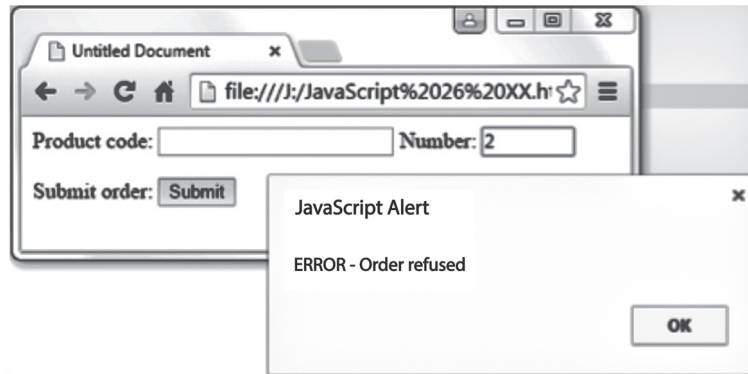
(iii) Complete the truth table for this system.

INPUT			Workspace	OUTPUT
R	T	W		X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		



(c) A web page used for data capture consists of:

- two text boxes for the entry of:
 - a product code
 - the number of items to be purchased.
- a button which is clicked when the user wants to submit this order.



Study the following web page.

```

1 <html>
2 <head>
3 <title>Untitled Document</title>
4 <script language="JavaScript">
5
6 function myButton_onmousedown()
7 {
8   var Message1 = "ERROR - Order refused";
9   var Message2 = "Product code OK";
10  var x = document.forms["form1"]["txtProductCode"].value;
11    if (x == "")
12    {
13      alert(Message1)
14    }
15    else
16    {
17      alert(Message2)
18    }
19  }
20 </script>
21
22 </head>
23 <body>
24 <form name = form1>
25   <label>Product code: </label>
26   <input type="text" name="txtProductCode" >
27   <label>Number: </label>
28   <input type="text" name="txtNumber" size = "5" >
29   <p>
30     <label>Submit order: </label>
31     <input type="button" name="btnSubmit" Value = "Submit"
32
33     onMouseDown = "myButton_onmousedown()" >
34   </p>
35 </form>
36
37 </body>
38 </html>

```



- (i) The developer has used three variables in the JavaScript code. State the
 - 1
 - 2
 - 3 [2]

- (ii) The button has an event whose identifier is `onMouseDown`. When the submit button is clicked, some code is executed.

State the line numbers that contain this code.

From line to line [1]

- (iii) The JavaScript code uses a selection statement.

State the line number that contains the condition.

Line number: [1]

- (iv) Describe the purpose of the validation check that the code performs.

.....

.....[1]

- (v) Name and describe **two** other types of validation check that could be appropriate for this data capture form.

Validation check:

Description

.....

Validation check:

Description

..... [4]

QUESTION 10.



6 Downloading a file from a website is an example of a client-server application.

(a) Describe what is meant by the term **client-server** for this application.

.....

.....

.....

.....[2]

(b) The following sequence of steps (1 to 5) describes what happens when someone uses their personal computer (PC) to request a web page. The web page consists of HTML tags and text content only. Four of the statements from **A**, **B**, **C**, **D**, **E** and **F** are used to complete the sequence.

A	Browser software interprets the script, renders the page and displays.
B	Browser software renders the page and displays.
C	Browser software compiles the script, renders the page and displays.
D	The web server retrieves the page.
E	The Domain Name Service (DNS) uses the domain name from the browser to look up the IP address of the web server.
F	The web server sends the web page content to the browser.

Write one of the letters A to F in the appropriate row to complete the sequence.

1. The user keys in the Uniform Resource Locator (URL) into the browser software.
2.
3.
4.
5.

[4]

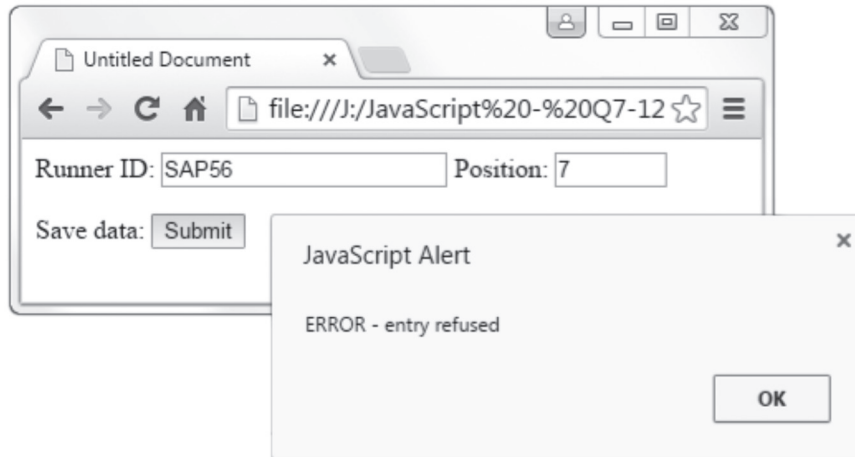


Question 6(c) begins on the next page.



(c) The following web page used for data capture consists of:

- two text boxes for the entry of:
 - a race runner's ID code
 - their finishing position in a race.
- a button that the user clicks to submit this runner's result.



```

1  <html>
2  <head>
3  <title>Untitled Document</title>
4  <script language="JavaScript">
5
6  function myButton_onmousedown()
7  {
8  var Output1 = "Runner ID OK";
9  var Output2 = "ERROR - entry refused";
10
11 var Runner ID = document.forms["form1"]["txtRunnerID"].value;
12 //                               || in Javascript is the 'OR' operator
13 if (RunnerID.substr(0,3) == "VAR" || RunnerID.substr(0,3) == "CAM")
14 {
15     alert(Output1)
16 }
17 else
18 {
19     alert(Output2)
20 }
21 }
22 </script>
23
24 </head>
25 <body>
26 <form name = form1>
27   <label>Runner ID: </label>
28   <input type="text" name="txtRunnerID" >
29   <label>Position: </label>
30   <input type="text" name="txtPosition" size = "5" >
31   <p>
32     <label>Save data: </label>
33     <input type="button" name="btnSubmit" Value = "Submit"
34
35     onMouseDown = "myButton_onmousedown()" >
36   </p>
37 </form>
38
39 </body>
40 </html>

```



- (i) The developer has used three variables in the JavaScript code. State the variables used.
 1.
 2.
 3.

[2]

- (ii) The button has an event whose identifier is `onMouseDown`. When the mouse button is clicked, some code is run.

State the line numbers which contain this code.

From line to line [1]

- (iii) The JavaScript code uses a selection statement.

State the line number which contains its condition.

Line number: [1]

- (iv) Describe the purpose of the validation check that the code performs.

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

- (v) Name and describe **two** other types of validation check which could be appropriate for this data capture form.

Validation check:

Description
.....

Validation check:

Description
.....

[4]



15
BLANK PAGE



QUESTION 11.



7 A clinic is staffed by several doctors. The clinic serves thousands of patients. Each one time, there is only one doctor in the clinic available for appointments.

The clinic stores patient, doctor and appointment data in a relational database.

(a) (i) Underline the primary key for each table in the following suggested table designs.

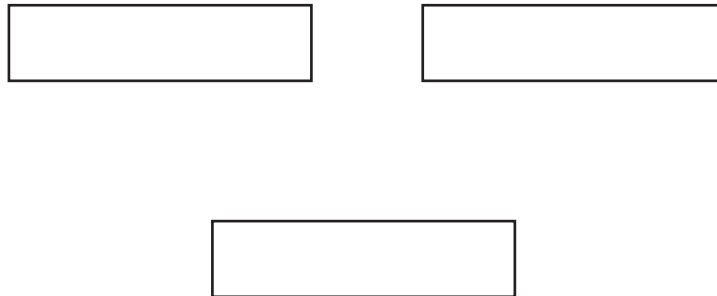
PATIENT(PatientID, PatientName, Address, Gender)

DOCTOR(DoctorID, Gender, Qualification)

APPOINTMENT(AppointmentDate, AppointmentTime, DoctorID, PatientID)

[2]

(ii) Complete the following entity-relationship (E-R) diagram for this design.



[2]

(b) The doctors are concerned that many patients make appointments but do not attend them.

Describe the changes to the table designs that could be made to store this information.

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



- (c) The doctors are about to set up a new clinic in the neighbouring village, SITE-B. The original location is identified as SITE-A.

A new table is designed to store the ID of the doctor who is able to work at each site.

DOCTOR-AVAILABILITY (DoctorID, Site)

Five entries stored in the table are:

DoctorID	Site
098	SITE-A
074	SITE-A
117	SITE-B
098	SITE-B
033	SITE-B

- (i) State what this data shows about the availability of the doctor with the ID of 098.

.....
[1]

- (ii) Opening a new clinic in the neighbouring village will not require any additional table for storing appointments. It will need a change to the existing appointment table design.

Show the revised APPOINTMENT table.

APPOINTMENT (.....
) [1]

- (d) The doctor with the ID of 117 has recently been allocated a new DoctorID of 017.

- (i) Write an SQL script to update this doctor’s record in the database.

UPDATE
 SET
 WHERE [3]

- (ii) Describe why this update could cause problems with the existing data stored.

.....

[2]

QUESTION 12.

Cambridge
International
AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level



CANDIDATE
NAME

CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--

COMPUTER SCIENCE

9608/12

Paper 1 Theory Fundamentals

October/November 2017

1 hour 30 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

Answer **all** questions.

No marks will be awarded for using brand names of software packages or hardware.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The maximum number of marks is 75.

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



- 1 One of the tasks of the operating system (OS) is the management of the main memory of the computer system.

State and describe **three** other operating system management tasks.

1

.....

.....

2

.....

.....

3

.....

.....

QUESTION 13.



Cambridge
International
AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE
NAME

CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--



COMPUTER SCIENCE

9608/11

Paper 1 Theory Fundamentals

October/November 2018

1 hour 30 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

Answer **all** questions.

No marks will be awarded for using brand names of software packages or hardware.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The maximum number of marks is 75.

This document consists of **15** printed pages and **1** blank page.



1 A student is creating a short video and needs to record music to play in the background.

(a) The student uses a microphone to capture the music.

Explain how the microphone captures the music.

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

(b) An analogue-to-digital converter uses sampling to encode the sound.

Explain how different sampling resolutions affect the sound file and the sound it represents.

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

(c) The student needs to edit the sound file.

Describe **two** features of sound editing software that can be used to edit the sound file.

Feature 1

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

Feature 2

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

[4]



(d) The video is recorded with a frame rate of 60 frames per second (fps) and progressive encoding.

(i) Describe what is meant by a **frame rate of 60 fps**.

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

(ii) Describe what is meant by **progressive encoding** in video recording.

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

(e) MP4 multimedia container format is used to save the video.

State what is meant by **multimedia container format**.

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

QUESTION 14.



Cambridge
International
AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE
NAME

CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--



COMPUTER SCIENCE

9608/12

Paper 1 Theory Fundamentals

October/November 2018

1 hour 30 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

Answer **all** questions.

No marks will be awarded for using brand names of software packages or hardware.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The maximum number of marks is 75.

This document consists of **13** printed pages and **3** blank pages.



1 A company is designing a website.

(a) The company creates a 4-colour bitmap image for the website as shown.

Each colour is represented by a letter, for example, G = grey, K = black.

G	R	G	K	W	R
G	R	G	K	W	R
G	R	G	K	W	R
G	R	G	K	W	R
G	G	G	K	K	R
W	W	W	W	K	R

(i) State the minimum number of bits needed to represent each pixel in the image in **part (a)**.

..... [1]

(ii) Calculate the minimum file size of the image shown in **part (a)**. Show your working.

Working

.....

.....

.....

File size

[3]

(b) The company takes a photograph of their office to put on the website. The photograph has a resolution of 1000 pixels by 1000 pixels. Two bytes per pixel are used to represent the colours.

(i) Estimate the file size of the photograph in megabytes. Show your working.

Working

.....

.....

.....

Estimated file size

[4]



(ii) The file size of the photograph needs to be reduced before it is placed on the website.

Draw lines to link each method of reducing the file size of the image to:

- its description and
- its compression type, where appropriate.

Description	Method	Compression type
Removes pixels	Crop the photograph	Lossy
Reduces number of pixels per inch	Use run-length encoding	Lossless
Uses fewer bits per pixel	Use fewer colours	
Stores colour code and count of repetitions		

[5]

(c) The company has created a logo for the website. The logo is a vector graphic.

Describe **two** reasons why a vector graphic is a sensible choice for the logo.

Reason 1

.....

.....

.....

Reason 2

.....

.....

.....

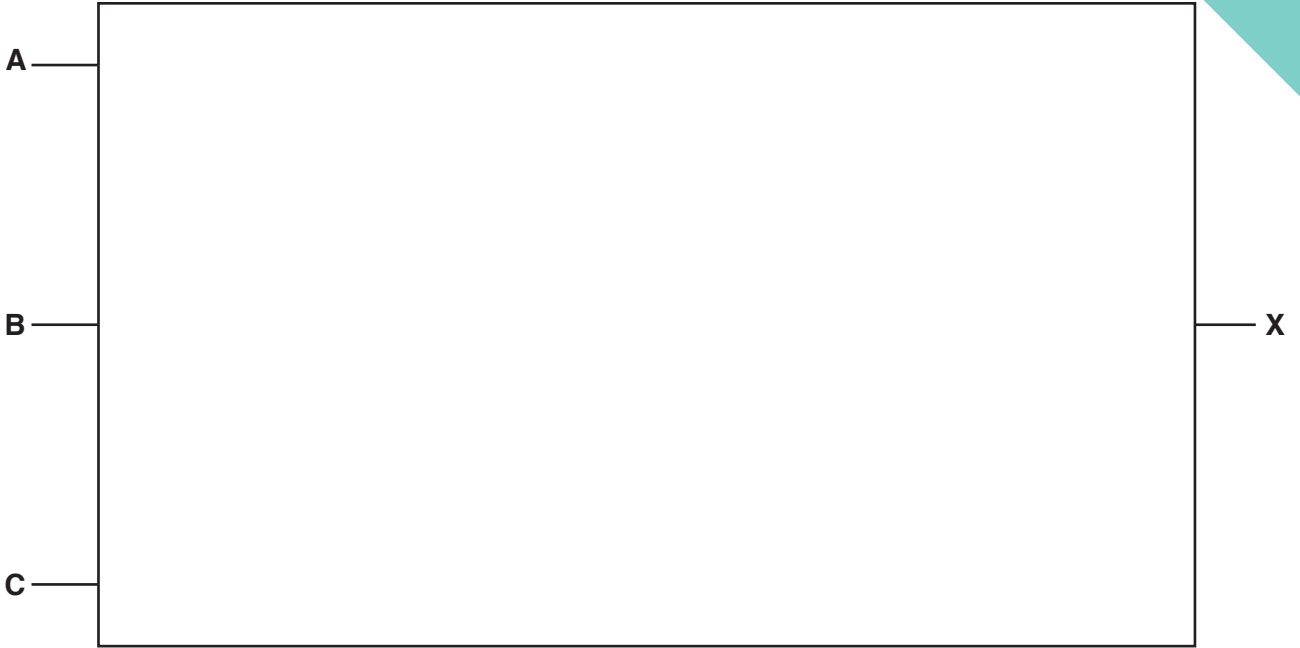
[4]

QUESTION 15.



8 (a) Draw a logic circuit to represent the logic expression:

$$X = (A \text{ XOR } B) \text{ OR } (\text{NOT}(C \text{ AND } A))$$



[4]

(b) Complete the truth table for the logic expression in part (a).

A	B	C	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]

15
BLANK PAGE



QUESTION 16.



2 A software company produces software and distributes it under different software licences.

(a) Four descriptions of software licences are given.

Write the type of software licence that best fits each description. Use a different type of licence for each description.

1. The software can be legally used, only after a fee has been paid.

Licence type

2. The source code comes with the software. If the software is modified, the edited source code must be released under the same conditions as the original software.

Licence type

3. The software is free for a trial period and then a fee is requested, or expected, if the user wants to continue to use the software.

Licence type

4. The source code comes with the software. The software is free to be downloaded, edited, and distributed, possibly without restriction.

Licence type

[4]

(b) The software company stores information about customers and the software licences they have purchased. The company considers a file-based approach for the storage and retrieval of data.

(i) Give **three** limitations of a file-based approach to store the data.

1

.....

2

.....

3

.....

[3]



(ii) The software company decides to use a database to overcome the limitations of a file-based system. Some of these limitations are addressed through the logical design.

Name **and** describe **two** levels of the schema of a database.

Name 1

Description

.....

Name 2

Description

.....

[4]

QUESTION 17.



Cambridge
International
AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE
NAME

CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--



COMPUTER SCIENCE

9608/13

Paper 1 Theory Fundamentals

May/June 2019

1 hour 30 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

Answer **all** questions.

No marks will be awarded for using brand names of software packages or hardware.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The maximum number of marks is 75.

This document consists of **14** printed pages and **2** blank pages.



1 A computer has an operating system (OS) and utility software.

(a) The following table lists key management tasks performed by an operating system and their descriptions.

Complete the table by writing the missing management task names and descriptions.

Management task	Description
Memory management	
	Provides user accounts and passwords
	Handles the signals sent when the attention of the processor is required elsewhere
Provision of a software platform	

[4]

(b) A hard disk formatter and a hard disk defragmenter are two examples of utility software.

(i) Describe the actions performed by a hard disk formatter and a hard disk defragmenter.

Hard disk formatter

.....

.....

.....

Hard disk defragmenter

.....

.....

.....

[4]



(ii) Identify **three other** examples of utility software that can be installed on

1

.....

2

.....

3

.....

[3]

QUESTION 18.



3 (a) A bank approves a customer for an account based on the criteria in the following table.

Parameter	Description of parameter	Binary value	Condition
A	Employed	1	True
		0	False
B	Self-employed	1	True
		0	False
C	Over 21	1	True
		0	False
D	Earn more than 30 000	1	True
		0	False
E	Another account	1	True
		0	False

A customer is approved ($X = 1$) if the person:

- is over 21 **and** employed
or
- is over 21 **and** self-employed **and**
 - **either** earns more than 30 000
or
 - has another account.

Draw a logic circuit to represent the model.



[5]

(b) Complete the truth table for the logic expression:

$$X = (A \text{ AND } C) \text{ OR } (\text{NOT } A \text{ AND } (B \text{ XOR } C))$$

A	B	C	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]



QUESTION 19.



4 Anushka needs to store information about bookings at a sports club.

(a) Anushka has a file-based storage system. She wants a relational database.

(i) Describe the features of a relational database that address the limitations of Anushka's file-based system.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(ii) The relational database design needs to be normalised. The following statements describe the three stages of database normalisation.

Complete the statements by filling in the missing words.

For a database to be in First Normal Form (1NF) there must be no groups of attributes.

For a database to be in Second Normal Form (2NF), it must be in 1NF, and contain no key dependencies.

For a database to be in Third Normal Form (3NF), it must be in 2NF, and all attributes must be fully dependent on the

[4]



(b) The **normalised** relational database, SPORTS_CLUB, has the following tables:

MEMBER (MemberID, FirstName, LastName, MembershipType)

SESSION (SessionID, Description, SessionDate, SessionTime, NumberMembers)

TRAINER (TrainerID, TrainerFirstName, TrainerLastName)

MEMBER_SESSION (MemberID, SessionID)

SESSION_TRAINER (SessionID, TrainerID)

(i) Anushka has designed an entity-relationship (E-R) diagram for SPORTS_CLUB.

Complete the entity-relationship (E-R) diagram.



[2]

(ii) Anushka first needs to create the database that she has designed.

Write a Data Definition Language (DDL) statement to create the SPORTS_CLUB database.

.....

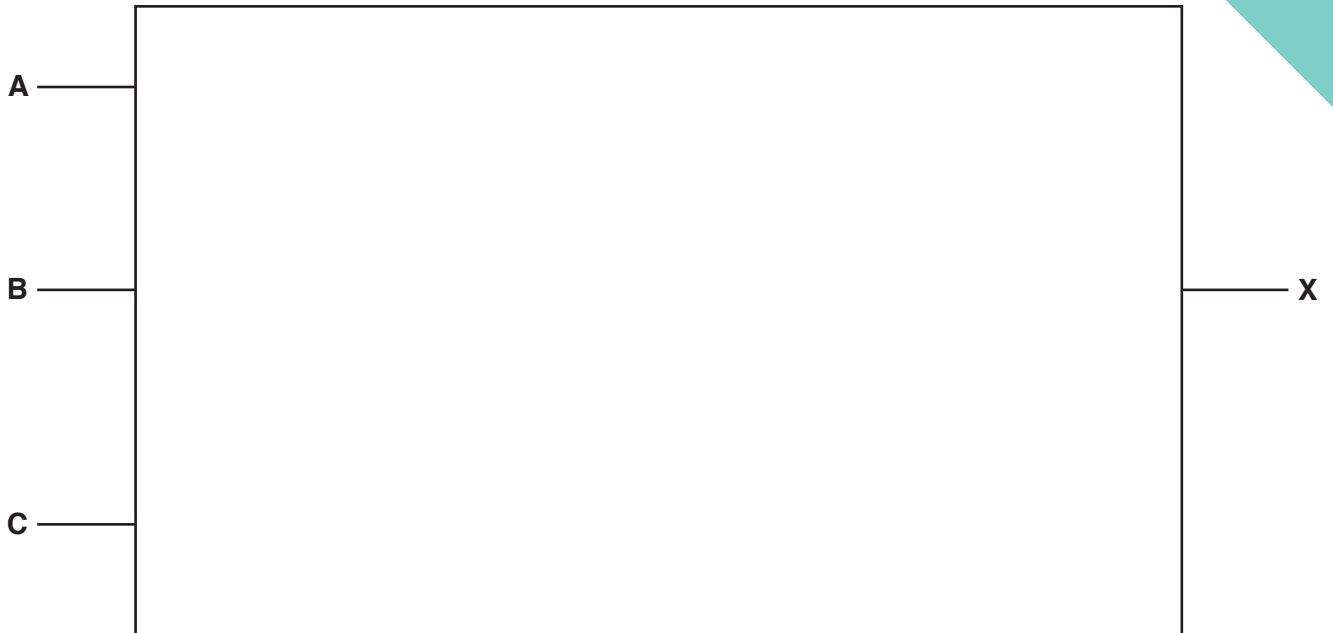
..... [1]

QUESTION 20.



5 (a) Draw a logic circuit to represent the logic expression:

$$X = \text{NOT } (A \text{ OR } C) \text{ OR } (A \text{ AND NOT } B)$$



[5]

(b) Complete the truth table for the logic expression:

$$X = \text{NOT } (A \text{ OR } C) \text{ OR } (A \text{ AND NOT } B)$$

A	B	C	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]



Question 6 begins on the next page.