

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

## **MARK SCHEME for the October/November 2015 series**

### **0478 COMPUTER SCIENCE**

**0478/13**

Paper 1, maximum raw mark 75

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<b>Page 2</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>Cambridge IGCSE – October/November 2015</b>	<b>0478</b>	<b>13</b>

- 1 (a) Temperature
- central heating / air con system
  - greenhouse environment
  - a chemical reaction / process

Magnetic field

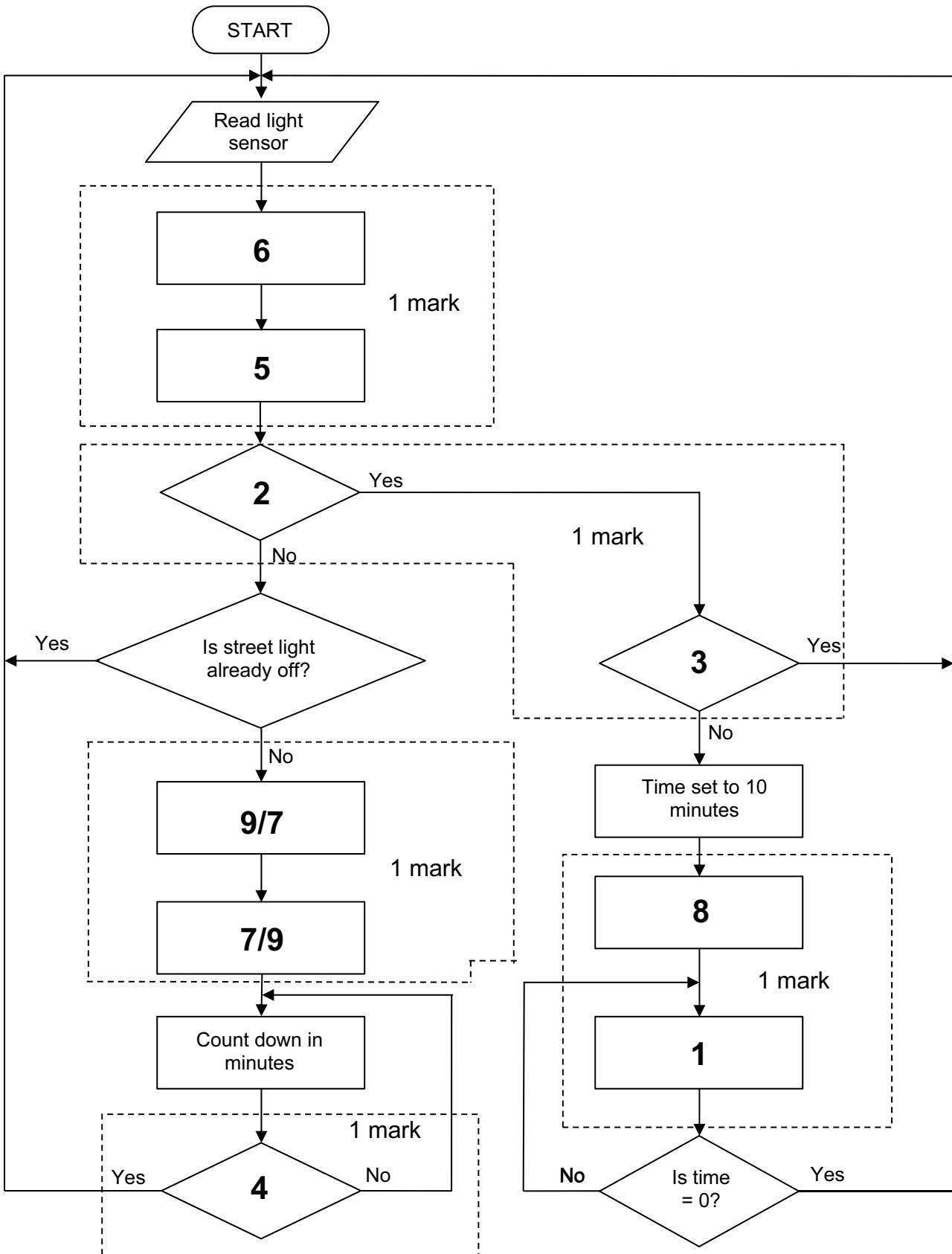
- anti-lock brakes on a car
- detection of motor vehicles (e.g. at traffic lights)
- reading magnetic ink characters on cheques
- geophysical surveys

Motion

- automatic doors
- burglar alarm

[3]

(b)



[5]

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0478	13

- 2 (a) Any **five** from:
- sensors send signals / data to microprocessor
  - signal / data converted to digital (by an ADC)
  - microprocessor compares temperature / carbon monoxide level / value with stored level / value
  - if CO level > stored value, microprocessor sends signal...
  - if temperature > stored value, microprocessor sends signal...
  - ...to light warning bulb on dashboard / sounds alarm
- [5]

(b) (i) **2 marks for all correct conditions, 1 mark for 2 correct conditions**

CO (carbon monoxide) level too high  
oil pressure too low  
brake pads too thin

[2]

(ii) 1 mark for each correct parity bit in position 1

1	1	1	1	0	0	1	0
---	---	---	---	---	---	---	---

0	0	0	0	1	1	1	0
---	---	---	---	---	---	---	---

[2]

(iii) 1 mark for correct parity bit + 1 mark for remainder of binary value

1	0	1	0	0	0	1	0
---	---	---	---	---	---	---	---

[2]

(iv) A 2 (allow follow through from part (iii))

[1]

3 (a) (i)

MAR

1	0	0	0	0	0	0	1
---	---	---	---	---	---	---	---

MDR

0	1	0	1	0	0	0	1
---	---	---	---	---	---	---	---

[2]

(ii)

MAR	1	0	0	0	1	1	1	0
-----	---	---	---	---	---	---	---	---

MDR	0	1	1	1	1	0	0	1
-----	---	---	---	---	---	---	---	---

[2]

(iii)

Address	Contents
1000 0000	0110 1110
1000 0001	0101 0001
1000 0010	1000 1101
1000 0011	1000 1100
}	}
1000 1100	
1000 1101	
1000 1110	<b>0111 1001</b>
1000 1111	

[1]

- (b) – CIR (Current Instruction Register)  
 – PC (Program Counter)  
 – Acc (Accumulator)

[3]

- (c) – Controls operation of memory, processor and input/output  
 – Instructions are interpreted  
 – Sends signals to other components telling them “what to do”

[3]

4 (a) (i) Free software / open source software

[1]

(ii) Any **three** from:

- Set of principles / laws that regulate the use of computers
- Covers intellectual property rights (e.g. copying of software)
- Privacy issues (e.g. accessing personal information)
- Impact of computers on society (relevant examples can be credited)

[3]

(b) 1 mark for each CORRECT row

Statement	Firewall	Proxy server
Speeds up access of information from a web server by using a cache		✓
Filters all Internet traffic coming into and out from a user's computer, intranet or private network	✓	✓
Helps to prevent malware, including viruses, from entering a user's computer	✓	
Keeps a list of undesirable websites and IP addresses	✓	✓

[4]

(c) **one** mark for method + **one** mark for linked reason (maximum 6 marks)

- back up files...
- ...on a regular basis/to another device/to the cloud
  
- set data to read only...
- ...to prevent accidental editing
  
- save data on a regular basis...
- ...to prevent loss/corruption of data in unexpected shutdown/failure
  
- use correct shut down/start up procedures...
- ...to prevent damage to components/stored files
  
- use correct procedures before disconnecting portable storage device...
- ...to prevent damage to device/data corruption
  
- keep storage devices in a safe place...
- ...away from fire hazards

[6]

- 5 (a) – Memory card/SSD/HDD/magnetic tape  
– Suitable description of device given

[2]

- (b) 2 hours = 120 minutes  
 $120 \times 180 = 21\,600$   
 $21\,600 / 1024$  (or  $21\,600 / 1000$ )  
= **21.1 GB (or 21.6 GB)**

(1 mark for correct answer and 1 mark for correct calculation)

[2]

- 6 Any **two** from:
- facial recognition software/biometric software used to scan face
  - face image converted to digital format/data by the camera
  - digital image formed from scanned photo/biometric data stored in passport
  - key features of the face are checked/compared

[2]

7

<b>Application</b>	<b>Suitable output device</b>
Production of one-off photographs of very good quality	<b>inkjet printer</b>
High volume colour printing of advertising flyers	<b>laser printer</b>
Production of an object, which is built up layer by layer; used in CAD applications	<b>3D printer</b>
Converting electrical signals into sound	<b>speaker/headphones</b>
Showing enlarged computer output on a wall or large screen	<b>Projector</b>

[5]

8 1 mark for each named application + 1 mark for each matching reason for choice

<b>Input device</b>	<b>Application and reason</b>
Light sensor	<p>Automatic doors – detects a person when light beam broken and opens doors</p> <p>Street lighting – detects change in light and switches on/off the street lights</p> <p>Greenhouse – ensures correct lighting conditions for growth of plants</p>
Keyboard	<p>Word processor/ spreadsheet/ database – need to key in data manually (e.g. report writing)</p> <p>Control room interface – need to manually key in data (e.g. flow speed of liquid)</p>
Barcode reader	<p>Supermarket checkout – read barcodes to find prices, description – allows automatic stock control</p> <p>Library system – can track books on loan – can link books to borrowers using barcoded cards</p> <p>Airport check-ins – barcodes on luggage to track whereabouts</p>
Touch screen	<p>Ticket/information kiosk – easy method for public to enter data – limited number of options</p> <p>Mobile phone/tablet – easy method to input data – use of icons for application selection</p> <p>Control room interface – faster/easier method to input data into system – fewer chances of error since number of choices limited</p>

[8]



<b>Page 9</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>Cambridge IGCSE – October/November 2015</b>	<b>0478</b>	<b>13</b>

- 9 (a)** 8 MB  
100 [2]
- (b) (i)** Any **two** from:  
 – removes sounds human ear can't hear very well  
 – if two sounds played at same time, softer sound removed  
 – uses perceptual music shaping [2]
- (ii)** Lossy [1]
- (iii) One** from, for example:  
 – jpeg  
 – MP4  
 – zip  
 – gif [1]
- 10** symmetric encryption
- encryption key
- plain text
- encryption algorithm
- cypher text [5]