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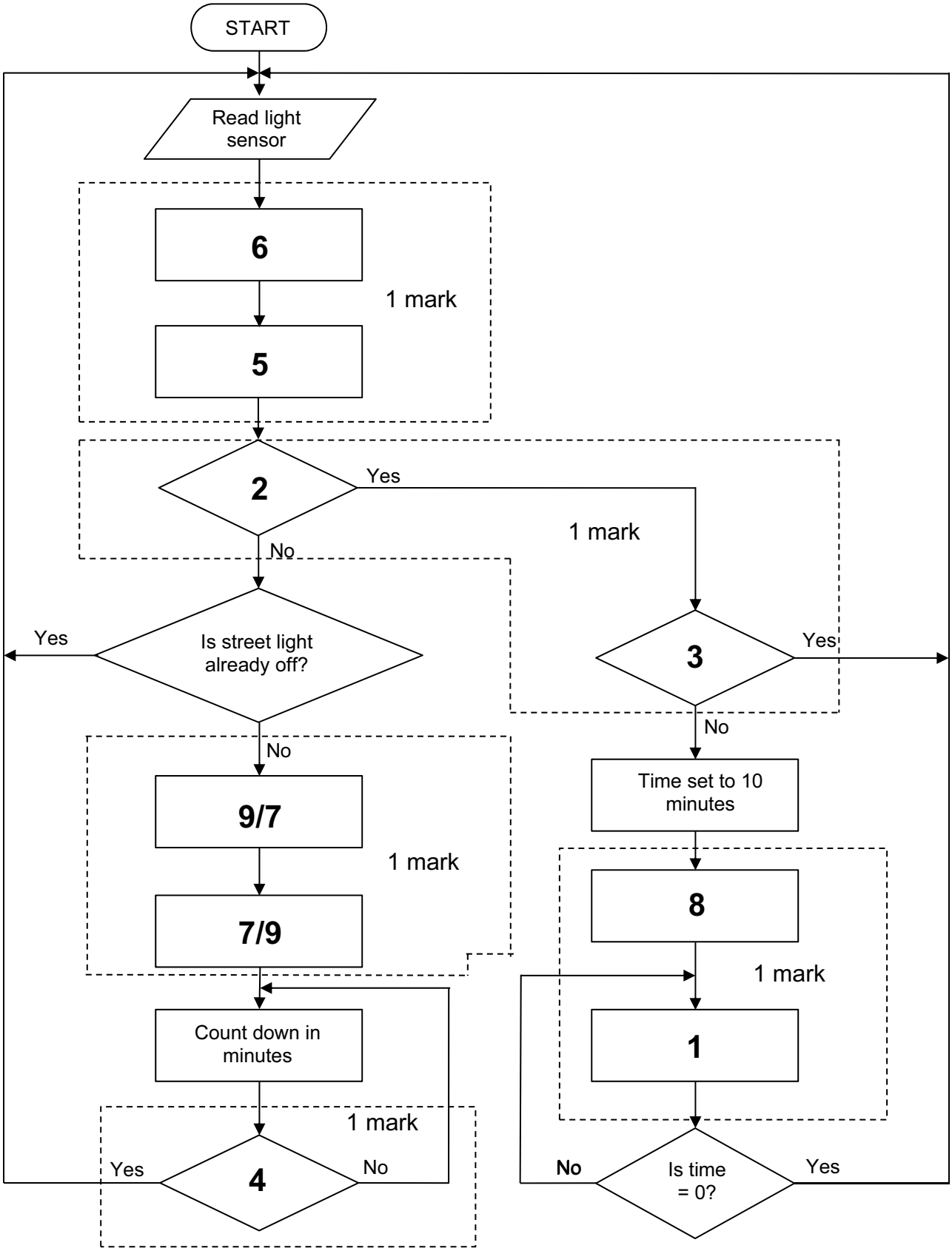
1 (a) Temperature
– central heating / air con system
– greenhouse environment
– a chemical reaction / process

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]

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(b)



[5]

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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]

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(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	**0111 1001**
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]

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(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]

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7

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

[5]

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

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

[8]

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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]

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