GradeMax

CAMBRIDGE
International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/11**

Paper 1 Theory **May/June 2026**

MARK SCHEME

Maximum Mark: 75

Published

This mark scheme contains the instructions and marking guidance that our examiners used to mark candidate responses for this component.

Before they start marking, examiners complete a standardisation process. They review a range of candidate responses and discuss the mark scheme in detail to agree which answers can and cannot be accepted. Examiners award marks where it is clear that candidate responses have met the requirements of the mark scheme. These requirements may vary between different components or different versions of the same component, depending on the exact requirements of the question and the candidate responses seen during the standardisation process.

Sometimes, our mark schemes may allow marks to be awarded to responses which contain elements that are factually incorrect or for content not covered by the syllabus. We do this in response to the demands of a specific question to support candidates and make sure that our assessments are fair. However, these allowances should not be used as a guide for teaching and learning.

We cannot discuss the mark scheme with schools, and we recommend that schools read the mark scheme together with the assessment material and the Principal Examiner Report for Teachers.

This document consists of **18** printed pages.

© Cambridge University Press & Assessment 2026

[Turn over

GradeMax

General marking principles

All examiners must apply these marking principles when marking candidate responses.

1	Examiners must award marks for each response in line with: • the specific **content** defined in the mark scheme • the specific **skills** defined in the mark scheme or in the level descriptions • the **standard of response** required as exemplified by the standardisation scripts.
2	Examiners must award **whole marks** (not half marks, or other fractions).
3	Examiners must award marks **positively**. This means that: • marks are not deducted for errors or omissions • marks are awarded for correct/valid answers as defined in the mark scheme and also for **other valid answers** which go beyond the scope of the syllabus and mark scheme referring to your team leader as appropriate • the quality of spelling, punctuation and grammar are judged **only** when the mark scheme indicates that these features are **specifically assessed** in the question. However, the meaning of all responses must be unambiguous.
4	Examiners must **consistently** apply the requirements of the mark scheme and any rules for what to do when candidates have not followed instructions correctly.
5	Examiners must use the **full range of marks** defined in the mark scheme, unless limited by the quality of the candidate responses seen.
6	Examiners must award marks according to the mark scheme and **must not** award marks with grade thresholds or grade descriptions in mind.

© Cambridge University Press & Assessment 2026

GradeMax

Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
	Correct point
	Incorrect point
	Unclear response
FT	Follow through
REP	Repetition
I	Ignore
BOD	Benefit of doubt given
NBOD	Benefit of doubt not given
TV	Content of response too vague
NAQ	Not answered question

© Cambridge University Press & Assessment 2026

GradeMax

Annotation	Meaning
	Omission
	Section not relevant
	Section incorrect
Highlighter	Information copied from the text
	Page or response seen by examiner

Mark scheme abbreviations

/	separates alternative words / phrases within a marking point
//	separates alternative answers within a marking point
underline	actual word given must be used by candidate (grammatical variants accepted)
max	indicates the maximum number of marks that can be awarded
( )	the word / phrase in brackets is not required, but sets the context
MP	mark point

Note: No marks are awarded for using brand names of software packages or hardware.

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
1(a)	A	**1**	If more than one box is ticked, no mark can be given.
1(b)	3	**1**	Mark the first answer given. Ignore any reference to unit. If no answer is written in the answer space an obvious correct answer can be awarded in the working space.
1(c)	C	**1**	If more than one box is ticked, no mark can be given.

© Cambridge University Press & Assessment 2026

0478/11 Mark Scheme June 2026

GradeMax

Question	Answer	Marks	Guidance
2(a)(i)	**One** from: • Program counter // PC • Memory Address register // MAR	**1**	Mark the first answer given.
2(a)(ii)	**Three** from: • The instruction is sent/copied to the current instruction register/CIR/control unit/CU // The CIR/CU receives the instruction // The CIR stores/holds the instruction … • … from the memory data register/MDR • The **control unit**/**CU decodes** the instruction • An instruction set is used (to decode the instruction) • The instruction is decoded/converted into the Opcode and Operand	**3**	BOD data in place of instruction MP1 – BOD instruction register/IR in place of CIR MP1 – this is given for the instruction being sent to the CIR/control unit. Allow if it is coming from an incorrect or inaccurate place e.g. MAR/PC MP3 – It must clearly state the CU is decoding the instruction
2(a)(iii)	**One** from: • Arithmetic logic unit // ALU • Accumulator // ACC • Control unit // CU • (Data/address/control) bus • Memory data register // MDR • Memory address register // MAR • Program counter // PC • Random access memory // RAM	**1**	Mark the first answer given. Register alone is NE Do not award CIR Award appropriate registers that are outside the specification e.g. Index register (IX) and status register (SR)

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
2(b)	**Two** from: • It can execute **more** instructions/FDE/FE/clock cycles **simultaneously** // **four** instructions/FDE/FE/clock cycles can be executed **simultaneously** rather than **two** • It can execute **more** instructions/FDE/FE/clock cycles **per second** • … as it has **double the number** of cores // It has **twice as many** cores // It has **more** cores // It has **4** cores instead of **2** cores	**2**	Tasks/processes/code/information/commands/actions/data is TV for instructions MP1 and 2 – BOD clock ticks/pulses in place of cycles
2(c)(i)	**Two** from: For example: • Touchscreen • Microphone • Keyboard/keypad • Button • Sensor • (Digital) camera	**2**	Mark the first answer given. Award any appropriate example of a sensor. Sensor can only be awarded once. Do not allow onscreen keyboard as this is software. Do not allow touchpad as it is not relevant to context.
2(c)(ii)	**Two** from: For example: • Screen // touchscreen • Speaker • LED // light • Actuator	**2**	Mark the first answer given. Display alone is NE for screen.

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
3(a)	**One** from: • Denary // decimal • Two's complement	**1**	Mark the first answer given. Accept other system outside syllabus e.g. octal, BCD BOD Base-10
3(b)	0010 1010	**1**	Mark the first answer given. Correct number of leading zeros must be present If no answer is written in the answer space an obvious correct answer can be awarded in the working space.
3(c)	0001 0000 0001	**1**	Mark the first answer given. Correct number of leading zeros must be present If no answer is written in the answer space an obvious correct answer can be awarded in the working space.
3(d)	71	**1**	Mark the first answer given. If no answer is written in the answer space an obvious correct answer can be awarded in the working space.
3(e)	2D8	**1**	Mark the first answer given. If no answer is written in the answer space an obvious correct answer can be awarded in the working space.

© Cambridge University Press & Assessment 2026

0478/11 Mark Scheme June 2026

GradeMax

Question	Answer	Marks	Guidance
3(f)	**One** mark for each correct nibble (MAX 2) **One** mark for the three correct carries as working **One** mark for one overflow bit For example: 1 1 1 1 0 0 1 1 1 0 1 + 1 1 1 1 0 0 0 0 1 1 0 0 0 1 1 0 1	**4**	Carries can be shown above/below. Award where seen as long as for the correct columns. BOD 4 carries shown if the overflow is shown as a carry first, then as overflow. Ignore the crossing out of carries. Award the number of carries seen.

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
4(a)	**One** from: • To **input data** // **interact** with/**navigate** the computer/interface • To control/move the **cursor** on the screen • To act as a pointing device/pointer • To allow the user to **click/select/choose/drag** (items on the screen) // by example • To **scroll** through different pages/a page	**1**	MP1 – 'it is an input device' is NAQ MP4 – BOD 'open' in place of click etc
4(b)	**Four** from: • (Serial) transmits the data one bit at a time • … down a single wire/channel/line • (Half-duplex) transmits the data (between the computer and the mouse) in both directions/ways … • … but only one direction/way at a time	**4**	MP1 – BOD bit by bit MP2 –cable/path is TV
4(c)	**Two** from: • Cannot plug the cable in the wrong way round • **Different** data transmission speeds are supported • High/adequate speed of data transmission • Universal connection/standard • Connection is **backwards** compatible • It will power the mouse // It will charge the mouse (if it has wireless capabilities) • The mouse will be **automatically** detected // Mouse drivers will be **automatically** downloaded // plug and play • Unlikely to have interference/crosstalk	**2**	Mark whole answer. Do not accept 'can be used over long distance'; this is not relevant to the context. Do not accept reference to skewing/errors as this is given in the question. MP3 – BOD fast/faster transmission. Fast/faster alone is NE. MP8 – Mouse is automatically connected is TV

© Cambridge University Press & Assessment 2026

GradeMax

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>4(d)</td><td>One mark for each correct function name or role

<table>
<tr><th>function</th><th>role</th></tr>
<tr><td>providing an interface</td><td>• To allow a user to communicate/interact with the computer/device/system</td></tr>
<tr><td>managing memory</td><td>It makes sure that two processes do not access the same memory location at the same time.</td></tr>
<tr><td>managing interrupts</td><td>• Checks the source of the interrupt
• Assigns/checks interrupt priority // Finds highest priority interrupt // Decides which interrupts to action
• Controls/checks the interrupt queue
• Calls/uses the interrupt service routine/ISR</td></tr>
<tr><td>managing (user) accounts // providing/managing (system) security</td><td>It allows the user to set a username and password.</td></tr>
</table></td><td>4</td><td>Providing an interface – BOD hardware/software in place of computer

Providing an interface – if an example alone is given e.g. ‘It allows the use of buttons’, this is NE.

Managing interrupts – BOD reference to handling the queue in any correct way

Managing interrupts – allow any correct reference to dealing with the priority of an interrupt

Managing interrupts – allow reference to moving current CPU task to stack. The OS does not strictly do this, but it is a fundamental part of the managing interrupts process

Managing accounts – ‘manages users’ is TV</td></tr>
</table>

© Cambridge University Press & Assessment 2026

0478/11 Mark Schei June 2026

GradeMax

Question	Answer	Marks	Guidance
5(a)	To translate/convert high-level language into low-level language/machine code/binary	**1**	Just translates code/program to low-level/machine code is NE
5(b)	Assembler	**1**	Mark the first answer given. Do not accept ‘assembly’.
5(c)	**One** mark for each correct letter **One** mark for each corrected statement • A • An interpreter translates and executes the code **one line/statement at a time** • E • A compiler produces an **executable** file	**4**	If an incorrect letter is given, do not read on to statement correction. Accept minor variations for correct statements that have the same meaning. For letter A we are looking for a correction on the use of variable. For letter E we are looking for a correction on the use of non-executable file. If no answer is given in answer space, look to see if indication is given in the table.

© Cambridge University Press & Assessment 2026

0478/11 Mark Scheme June 2026

GradeMax

Question	Answer	Marks	Guidance
5(d)	**One** mark for each correct function **One** mark for a matching purpose • Code editor • Allows the **user/programmer** to write/change the program • Run-time environment • Allows the user to **run**/**execute** the code and see the **output**/**result** // Allows the user to **input data** to **run**/**execute** the code // To allow the user to test the code • Error diagnostics // debugging tools // by example e.g. break points, stepping, variable watch window • Finds/identifies/detects errors in the code // by example • Auto-completion • Gives **options** to complete the remainder of a command word/key term/identifier/syntax (to limit errors/speed up development) // It **predicts** the rest of a command word/key term/identifier (to limit errors/speed up development) // It **predicts** the required syntax e.g. when a bracket is needed (to limit errors/speed up development) • Auto-correction • Corrects **spelling** errors in command words/key terms/identifiers/syntax (to limit errors in the code) • Prettyprint // syntax highlighting // colour coding • Changes the colour of text in the code to highlight command words/key terms/identifiers (to make them easier to identify) • Line numbers • To give (incremented) numbers to each line in the code (to allow a line in the code to be easily/quickly found)	**4**	Do not accept translator/interpreter/compiler, this is given in the question. Mark first function given. If the function name is TV/blank, read on to the purpose to see if a correct function name is included. Award both correct name and purpose if seen. Award the purpose if the function name is still TV but it is obvious what is meant. Code editor – BOD just editor alone Code editor purpose – BOD edit in place of write/change Error diagnostics – just 'debugging' alone is TV Just 'words' alone is TV for command word/key term/identifier/syntax Allow minor spelling variations on function names. It you see something that you think is a viable alternate to the function name, please refer to your TL. Other viable functions outside the syllabus may be seen, such as: • artificial intelligence • auto-documentation • expand/collapse code blocks • built-in libraries/functions In this case, accept the function and a correct description of the purpose. The description must be specific and not generic. Refer to TL if in doubt.

© Cambridge University Press & Assessment 2026

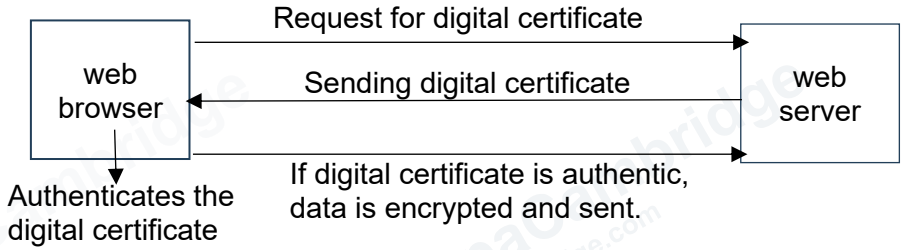
0478/11 Mark Scheme June 2026

GradeMax

Question	Answer	Marks	Guidance
6(a)	**One** mark for each correct term in the correct place. • domain name server (DNS) • IP address • web browser • request • hypertext markup language(HTML) The user types the URL into the address bar. The web browser sends the domain name from the URL to the **domain name server (DNS)**. This searches for the matching **IP address** and sends this back to the **web browser**. The web browser sends a **request** to the web server for the web page. The web server then sends the data for web page back to the web browser. The web browser renders the **hypertext markup language (HTML)** to display the web page.	**5**	

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
6(b)	**Five from, one** mark for each correct section of the diagram. • Web browser sending a request to the web server for its (digital) certificate/to identify itself • Web server sending (digital) certificate to the web browser • **Web browser authenticating/validating** the (digital) certificate … • … showing the data sent if it is valid // showing data not sent if it isn't valid • The data is **encrypted // Encryption** is used … • … using **public** and **private** keys // using **asymmetric** encryption • … to make any data sent meaningless • The **web browser** uses the **public key** to **encrypt** the data • The **web server** uses the **private key** to **decrypt** the data For example:  	**5**	MP3 - Checking the certificate/web server is safe is TV. MP3, MP4 and MP5 can be awarded in one annotation e.g. If the web browser thinks the certificate is authentic the encrypted data is sent. MP4 – BOD 'communication begins if certificate is authentic' in place of the data being sent. MP4 – Data could be sent either way, so from browser to server or server to browser MP6 – BOD two **different** keys are used, just 2 keys is TV

© Cambridge University Press & Assessment 2026

0478/11 Mark Scheme June 202

GradeMax

Question	Answer	Marks	Guidance
7(a)	Acoustic sensor	**1**	Mark the first answer given. Sound/noise sensor is TV. Microphone is NE.
7(b)	Any **two** from: • Proximity sensor • Infrared sensor • Light sensor • Magnetic field sensor	**2**	Mark the first answer given.
7(c)(i)	Any **one** from: • It has a mechanical structure/framework • It is programmable • It has the ability to move	**1**	Mark whole answer. MP1 – It is mechanical is TV MP2 – It can follow instructions is TV
7(c)(ii)	Any **three** from: • The microprocessor/it compares the received data/data sent to the stored value/preset value (of 10) • If the **data/value** received is **less than 10**, (the microprocessor) sends a **signal** to stop the robot • (The signal is sent) to an actuator that is used to stop the robot	**3**	MP2 – 'when an object/distance/robot is less than 10cm' is TV. MP3 – just reference to an actuator is NE here. Must be saying the actuator is what is used to trigger the action to stop the robot in some way.

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
7(d)	Any **four** from: For example: • It can use machine learning • … by adapting its own data/rules/processes • It can **create/makes** a (digital) map (of the room) // Records/collects data about the **shape**/**dimensions** of the room • … and **record**/**store** the **location** of objects • **GPS** may be used to record the location of objects • It can **update** its (digital) map • … to **record**/**store** when objects are **moved**/**removed**/**added** • It can store successful/unsuccessful routes/actions (that avoid objects)	**4**	Do not accept 'it can learn where objects are placed in the room'. This is given in the question.

© Cambridge University Press & Assessment 2026

GradeMax

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>8(a)</td><td>Any three from:

• A character set is used …
• … that contains all the characters (that can be represented)
• It can use ASCII/Unicode
• Each/a character is given/has a (binary) value</td><td>3</td><td>MP4 – BOD if code used in place of value</td></tr>
<tr><td>8(b)(i)</td><td>One mark for each correct term or definition.

<table><tr><th>term</th><th>description</th></tr><tr><td>pixel</td><td>the smallest unit of an image that is made up of one colour</td></tr><tr><td>sound sample</td><td>a (single) measure/representation of the amplitude/height of a sound wave</td></tr><tr><td>(image) resolution</td><td>the dimensions of an image</td></tr><tr><td>colour depth</td><td>the number of bits that are used for each/a colour/pixel (in an image) // the (maximum) number of colours that can be represented (in an image)</td></tr><tr><td>Sample/sampling rate/frequency</td><td>the number of samples that are recorded each second</td></tr></table></td><td>5</td><td>Colour depth – ‘the number of colours in the image’ is not accurate</td></tr>
<tr><td>8(b)(ii)</td><td>Lossy // by example e.g. motion estimation
Lossless // by example e.g. RLE</td><td>2</td><td>Mark the first answer given.

Do not accept file formats e.g. MP4, ZIP

BOD lossyless for lossless</td></tr>
</table>

© Cambridge University Press & Assessment 2026