OCR
Oxford Cambridge and RSA

Cambridge **TECHNICALS LEVEL 3**

IT

Cambridge TECHNICALS 2016

Unit 18

Computer systems – hardware

K/507/5021

Guided learning hours: 60

Version 1 September 2015

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Essential resources required for this unit: Learners will require the use of PCs, plus various components of computer systems, with a view to updating and installing the components to the PC.

This unit is internally assessed and externally moderated by OCR.

UNIT AIM

The aim of this unit is to enable you to understand how the components of computer systems work together. You will develop the skills needed to recommend appropriate hardware systems for various purposes. Using the skills developed you will build/upgrade a full computer system with a view to testing and considering preventive maintenance procedures.

This is an optional unit within the IT Infrastructure Technician and the Emerging Digital Practitioner specialist pathways. It is important that IT technicians and network technicians have in depth knowledge, skills and understanding associated with the installation, upgrade, troubleshooting and maintenance of hardware for computer systems. Computer systems and associated hardware is an important area within emerging digital technologies.

The learning within this unit will also support the delivery of the CompTIA A+ and Cisco ITE qualification objectives.

TEACHING CONTENT

The teaching content in every unit states what has to be taught to ensure that learners are able to access the highest grades.

Anything which follows an i.e. details what must be taught as part of that area of content. Anything which follows an e.g. is illustrative, it should be noted that where e.g. is used, learners must know and be able to apply relevant examples in their work, although these do not need to be the same ones specified in the unit content.

For internally assessed units you need to ensure that any assignments you create, or any modifications you make to an assignment, do not expect the learner to do more than they have been taught, but must enable them to access the full range of grades as described in the grading criteria.

Learning outcomes The Learner will:	Teaching content Learners must be taught:

1. Understand the components of a computer system	1.1 Computer hardware components, i.e.:
	• internal system unit components
	    ○ processors
	    ○ motherboards
	    ○ BIOS / UEFI
	    ○ hard drive configuration and controllers (e.g. SATA, IDE, master, slave)
	    ○ Thunderbolt
	    ○ VGA, DVI, DisplayPort, HDMI
	    ○ internal memory (e.g. RAM, ROM, cache)
	    ○ specialised cards (e.g. network, graphic cards, sound).
	    ○ power supply
	• peripheral devices
	    ○ output devices (e.g. monitor, printer, speakers)
	    ○ input devices (e.g. camera/webcam, scanner, microphone, mobile devices)
	
	1.2 Storage, i.e.:
	• pen drives
	• optical media
	• flash memory cards
	• cloud
	• portable and fixed drives
	• DASD
	• SAS
	• SSD
	• enterprise storage
	• NAS
	• SAN
	• hybrid systems
	• virtual tape drives
	• characteristics
	• advantages
	• disadvantages
	• performance factors (e.g. security, capacity, transfer rate)

Learning outcomes The Learner will:	Teaching content Learners must be taught:

2. Be able to propose a computer system for identified business requirements	2.1 Understanding business requirements, i.e.:
	• purpose
	• software
	• hardware
	• network sharing
	• maintenance
	• outputs
	• integration
	• accessibility including special requirements e.g. user has physical limitations)
	
	2.2 Design considerations, i.e.:
	• single points of failure
	• recovery techniques i.e.:
	    ○ clustering
	    ○ replication
	• upgrade or renew
	• cost (e.g. financial, time, user)
	• services delivered
	• business requirements
	
	2.3 Backup storage recommendations, i.e.:
	• advantages/disadvantages (e.g. cost, security, capacity, frequency of saving, transfer rate, redundancy, expansion)
	• DASD
	• SAS
	• SSD
	• enterprise storage
	• NAS
	• SAN
	• hybrid systems
	• virtual tape drives.
	• hard disks
	• cloud
	
	2.4 Load balancing (e.g. optimise resource use, maximise throughput, minimise response time, and avoid overload of any single resource)
	
	2.5 Methods of presentation of proposal (e.g. presentation, report, quote)

3. Be able to build or upgrade computers	3.1 Health and safety considerations, i.e.: • anti-static mats • wristbands • anti-static bags • appropriate use of tools

Learning outcomes The Learner will:	Teaching content Learners must be taught:
	3.2 Configuration, i.e.: • BIOS configuration (e.g. setting a BIOS password, editing power management options) • anti-virus configurations • start-up options and logon/access permissions 3.3 Preventative maintenance, i.e.: • organisation, naming, deletion and archiving of files • back-up procedures (e.g. data prior to upgrading computer system, storage of backup, system backup for recovery) • defragmentation • deleting temporary files • cleaning hardware • partition hard drives • replacing consumables (e.g. printer paper, toner cartridges)
4. Be able to test and evaluate the functionality of computer systems	4.1 Test plan/table for accuracy and functionality to include: • test no • type of test • purpose of test • expected results • actual results • issue identified • resolution for identified issue • re-test no 4.2 Diagnostic software, i.e.: • memory diagnostics tools • device manager • control panel • administrative tools • event viewer • system information • command prompt • Regedit 4.3 Benchmarking, i.e.: • Windows system assessment tool • 3DMark • Prime95 • Novabench • PCMark • SiSoftware Sandra • HD Tune

GRADING CRITERIA

LO	Pass	Merit	Distinction
	The assessment criteria are the Pass requirements for this unit.	To achieve a Merit the evidence must show that, in addition to the pass criteria, the candidate is able to:	To achieve a Distinction the evidence must show that, in addition to the pass and merit criteria, the candidate is able to:
1. Understand the components of a computer system	P1*: Explain the function of computer hardware components (*Synoptic assessment from Unit 1 Fundamentals of IT, Unit 2 Global information and Unit 3 Cyber security)	M1: Compare and contrast different hardware storage devices	
	P2: Outline different types of backup storage available		
2. Be able to propose computer systems for identified business requirements	P3: Select appropriate components to support identified business requirements		D1: Justify the components chosen and how they meet the identified business requirements
3. Be able to build or upgrade computers	P4: Install different hardware components on an identified computer system	M2: Recommend preventive maintenance activities for the identified computer system	
	P5: Implement preventative maintenance requirements for the identified computer system		
4. Be able to test and evaluate the functionality of computer systems	P6: Plan and implement test activities for the identified computer system, rectifying any errors	M3: Select and implement benchmarking activities for the identified computer system	D2: Analyse results from benchmarking activities for the identified computer system

SYNOPTIC ASSESSMENT

When learners are taking an assessment task, or series of tasks, for this unit they will have opportunities to draw on relevant, appropriate knowledge, understanding and skills that they will have developed through other units. We've identified those opportunities in the grading criteria (shown with an asterisk). Learners should be encouraged to consider for themselves which skills/knowledge/understanding are most relevant to apply where we have placed an asterisk.

ASSESSMENT GUIDANCE

LO1 Understand the components of a computer system

P1: Learners are required to explain the functions of the main internal and external components of a computer system. To evidence this learners could provide a detailed user guide that explains the functions of the computer components. The evidence could be presented as a report, part of a technical guide or a presentation (which can either be videoed or have detailed speaker notes).
P2: Learners are required to outline different types of backup storage as identified in the teaching content. The evidence can be in the form of a report, presentation (either videoed or with detailed speaker notes) or as a teacher resource.
M1: Learners are required to compare and contrast different types of hardware storage devices. The comparisons should include the similarities and differences between the devices including performance factors as outlined in the teaching content. The evidence could be presented as a report, part of a technical guide or presentation (either videoed or with detailed speaker notes).

LO2 Be able to propose computer systems for identified business requirements

P3: Learners are required to select appropriate components to support identified business requirements. They will need to be provided with a scenario that will enable them to consider each of the design considerations as per the teaching content. The evidence could be in the form of a report, presentation or work plan for the system.
D1: Learners are required to justify why they have chosen the components and backup storage from P3.The evidence could be an extension to P3 or a separate report or presentation with the justifications clearly provided.

LO3 Be able to build or upgrade computers

It is important that learners are provided with health and safety equipment, including hardware, that will enable them to build and install hardware safely. Once they have built or upgraded the system they can then carry out the benchmarking activities.
P4: Learners are required to install hardware components for a computer system. They could build or upgrade the system that they have designed in LO2. Learners must adhere to all health and safety considerations during the handling and installation of the components. The evidence could be presented as a report supported with annotated photographs, or presentation (either videoed or with detailed speaker notes). Witness testimonies can be used as another valid form of accompanying evidence.
M2: Learners are required to suggest preventative maintenance activities that are needed for the upkeep of the identified computer system. The evidence could be in the form of a report or a maintenance plan.

P5: Learners are required to implement preventative maintenance for the given system. The evidence could be presented as a report with annotated photographs, presentation (either videoed or with detailed speaker notes) or a completed work plan with printouts confirming the results of the activities.

LO4 Be able to test and to evaluate the functionality of computer systems

Learners will need to be provided with a system that will enable them to carry out testing, or ideally they would carry out testing on the system that they have built or upgraded.

P6: Learners are required to prepare and implement a test plan for a specified system. The test plan should be completed during and after any build, grade and/or maintenance activities and not completed retrospectively. The evidence will be the test plan with results of tests. Any errors should be clearly identified including resolution and re-testing.

M3 and D2: Learners will need to have access to a good range of programs that will enable them to benchmark the computer.

M3: Learners are required to select and implement benchmarking activities for an identified computer system. The evidence could be in the form of a report explaining the benchmarking activities selected and printouts showing the results of implementing the selected activities.

D2: Learners are required analyse the results of the benchmarking activities from M3. The evidence could be in the form of a report which may include statistical and/or graphical analysis of the results, a presentation with detailed speaker notes or a technical guide on how to analyse benchmarking test results.

Some providers for the industry qualifications offer quizzes, tests and assessments. Reference to these websites may support knowledge and learning.
www.**comptia**.org
www.**cisco**.com/UK

Feedback to learners: you can discuss work-in-progress towards summative assessment with learners to make sure it's being done in a planned and timely manner. It also provides an opportunity for you to check the authenticity of the work. You must intervene if you feel there's a health and safety risk.

Learners should use their own words when producing evidence of their knowledge and understanding. When learners use their own words it reduces the possibility of learners' work being identified as plagiarised. If a learner does use someone else's words and ideas in their work, they must acknowledge it, and this is done through referencing. Just quoting and referencing someone else's work will not show that the learner knows or understands it. It has to be clear in the work how the learner is using the material they have referenced **to inform their** thoughts, ideas or conclusions.

For more information about internal assessment, including feedback, authentication and plagiarism, see the centre handbook. Information about how to reference is in the OCR *Guide to Referencing* available on our website: http://www.ocr.org.uk/i-want-to/skills-guides/.

EMPLOYABILITY SKILLS

Employability skills	Learning outcome
Communication	P1,P3,D1,M2
Problem solving/decision making	M1,D1,P5,M2,P6,M3,D2
Time management	P6,M3,D2
Critical thinking	M1,P3,D1,M2

MEANINGFUL EMPLOYER INVOLVEMENT - a requirement for the Diploma (Tech Level) qualifications

The 'Diploma' qualifications have been designed to be recognised as Tech Levels in performance tables in England. It is a requirement of these qualifications for centres to secure for every learner employer involvement through delivery and/or assessment of these qualifications.

The minimum amount of employer involvement must relate to at least one or more of the elements of the mandatory units.

Eligible activities and suggestions/ideas that may help you in securing meaningful employer involvement for this unit are given in the table below.

Please refer to the *Qualification Handbook* for further information including a list of activities that are not considered to meet this requirement.

Meaningful employer involvement	Suggestion/ideas for centres when delivering this unit
1. Learners undertake structured work-experience or work-placements that develop skills and knowledge relevant to the qualification.	Learners could undertake work experience to support the school's or college's IT technicians or with local computer businesses – the work experience should be structured so that learners can see in context all or some of the learning outcomes in this unit.
3. Learners take one or more units delivered or co-delivered by an industry practitioner(s). This could take the form of master classes or guest lectures.	Centres could arrange for local IT technicians to deliver a session to learners which would provide an insight into an IT technician's role when: a) discussing with a client their individual requirements for a computer system b) formulating considerations when selecting and installing hardware components c) Implementing preventative maintenance activities for large and small computer systems.

To find out more
ocr.org.uk/it
or call our Customer Contact Centre on **02476 851509**

Alternatively, you can email us on **vocational.qualifications@ocr.org.uk**

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