

Answers to Student's Book

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4 Software

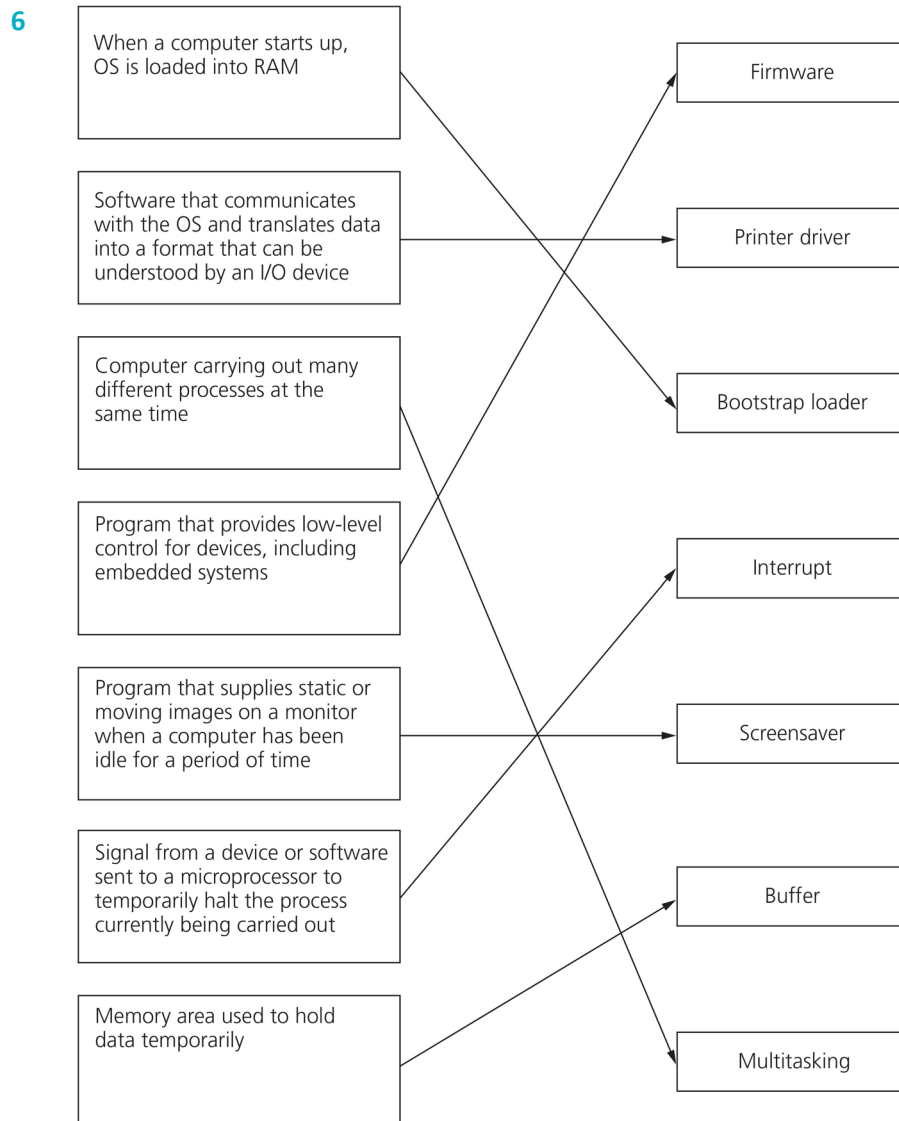
Answers to activities

4.1

1	Software	System software	Application software
	Screensaver	✓	
	Anti-virus software	✓	
	Control and measurement software		✓
	Printer driver	✓	
	Video editing software		✓
	Compiler	✓	
	QR code reader		✓
	On-screen calculator		✓
	Operating system software	✓	

- 2 a buffer
- b
- data sent to printer buffer
 - meanwhile, data from download/video buffer is sending data to video player
 - once printer buffer is full, attention returned to video download and video buffer starts to fill again
 - document starts to print
 - when printer buffer is empty, an interrupt is sent to microprocessor requesting more data
 - microprocessor temporarily halts video download process to service printer
 - more data is sent to the printer buffer
 - meanwhile video player plays movie
 - if video buffer is at minimum value, an interrupt is sent to stop other processes to allow video buffer to start filling again
 - process goes on until whole document is printed out
- c interrupt sent to CPU indicating an error and message appears on screen; printing process suspended until new black ink cartridge is installed
- 3
- | | |
|----------------------------|--|
| Human computer interface | can be CLI or GUI; permits user to interact with computer |
| Multitasking | allows computer to carry out several tasks at the same time (allocating resources to each task) |
| Platform (to run software) | all apps come under the control of OS; manages movement of data into and out of RAM to allow software to run with required resources |
| User account management | allows more than one user to log onto a computer; each user is allocated separate parts of memory; administrator has overall control |
| Managing files | carries out specific tasks (for example, create, open, close, delete, rename, copy, etc.); maintains directory structures; monitors access control mechanisms and ensures they are maintained; loads files into memory as required |
| Hardware management | involves management of all I/O devices; communicates with devices via device drivers; ensures allocation of resources according to priority; manages queues and buffers |
| Memory management | manages RAM and keeps track of which apps are using memory locations; prevents competing apps from using the same memory locations |
| Interrupt handling | handles interrupts from hardware and software to ensure they are serviced in correct priority and that all devices have access to the CPU and resources as required |
| System security | ensures the integrity, confidentiality and availability of data is maintained; use of passwords, maintaining access rights, and so on |

- 4
- A descriptor is a collection of information about devices.
 - Descriptors include the vendor ID, product ID and serial number of a device.
 - If a device doesn't have a unique serial number associated with it, the OS will treat the device as new every time it is plugged into a USB port.
 - When a device is plugged in, descriptors are used to recognise the device and load the device driver automatically.
- 5 a
- when the computer is powered up, part of the OS needs to be loaded into RAM ...
 - ... this is called the bootstrap (loader)
 - start-up is handled by the BIOS ...
 - ... which tells the computer where the storage device that hold the OS can be located
 - BIOS is stored on firmware, such as EEPROM
- b
- BIOS settings are stored on a CMOS chip ...
 - ... which is powered at all times by a battery on the motherboard
 - user can change BIOS settings if required but not the BIOS software



4.2

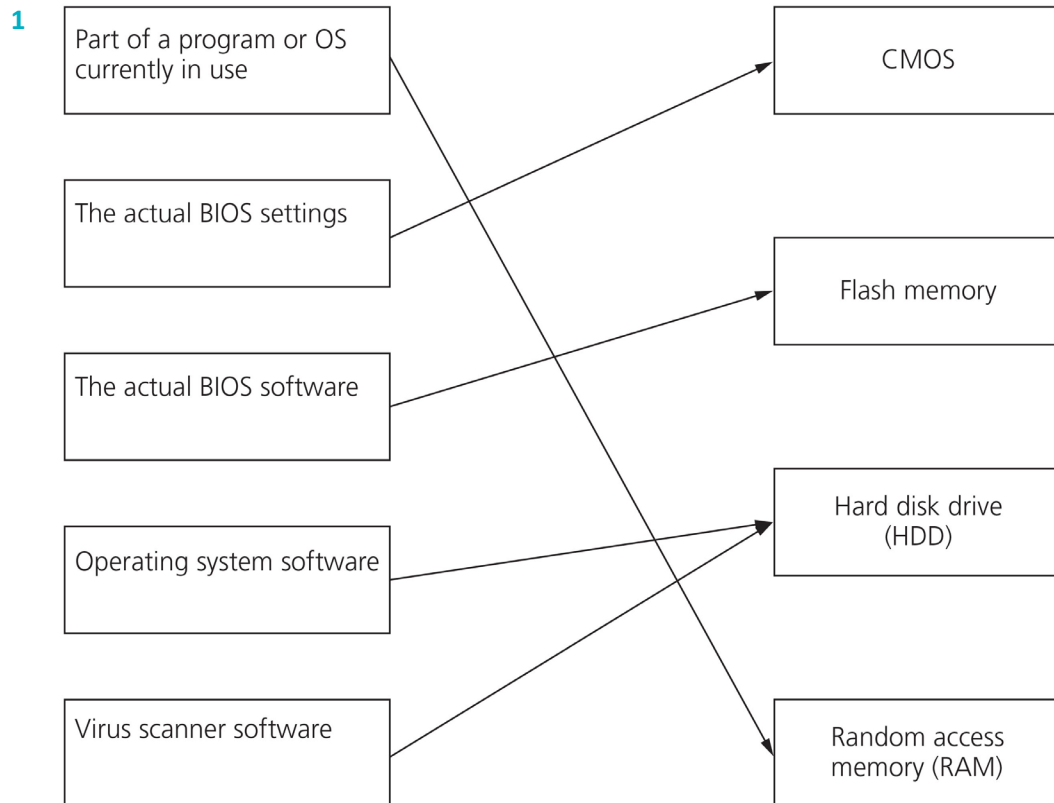
1

	True	False
An assembler translates a high-level language program.		✓
It is more difficult to write a program in a low-level language.	✓	
Java is an assembly language.		✓
It is quicker to develop a program using a high-level language.	✓	
You always need a compiler to run a compiled program.		✓
A program that is interpreted takes a longer time to run than a compiled program.	✓	
Low-level languages are machine dependent.	✓	

- 2 a
- Auto-completion means that an IDE can automatically show the reserved words or variable names that are available for use, so that the correct one can be picked from a list.
 - Prettyprinting – code editors can colour code parts of a program, for example reserved words or strings and automatically lay out the program in a meaningful way.
 - Translators are supplied as part of the IDE; these can be compilers or interpreters or both.
- b A compiler translates the whole program written in a high-level language into machine code program. An interpreter executes a program written in a high-level language by translating then executing each line of the program.
- A compiler can produce a file containing the translated machine-code program that can be executed without the compiler, whereas an interpreter will always need to be present during the execution of an interpreted program.
- c Assembly language programs can be smaller in size and execute tasks more quickly as fewer instructions are used, programs can also control specialist hardware using appropriate simple commands.

Answers to exam-style questions

Answers to questions 6 and 7 in this section are example answers for past paper questions. The details of the relevant past paper can be found with the corresponding exam-style question in the Student's Book.



- 2**
- a** virus scanner
 - b** defragmentation
 - c** security software
 - d** screen saver
 - e** device driver
- 3**
- a** provide a platform for the execution of apps and also provides an HCI (human-computer interface), memory management, security management and management of user accounts, hardware management (e.g. keyboards and monitors), file management, handles interrupts, manages multitasking (i.e. running more than one application at a time)
 - b** memory management system which gives the impression that the RAM is larger than it is; involves moving data into and out of RAM and HDD/SSD
 - c** this occurs when large volumes of data are being moved in and out of HDD; involves a large number of head movements
 - d** program within the operating system that allows a user to run several applications at the same time; but only one app is actually 'active' at any given time
 - e** signal sent from a device or software to a processor to temporarily halt the process currently being run

4 a Graphical user interface (GUI):

- uses pictures or symbols (icons) on screen to allow selection of options
- selection is done via pointing devices or using touchscreen technology
- common system is WIMP when pointing devices used
- Windows manager looks after the interaction between Windows, applications and pointing devices/cursor position for touchscreen

Command line interface (CLI):

- user has to type in instructions/commands to choose options or launch apps
- user is in direct communication with the computer
- interface/input is via a keyboard and command box
- user needs to learn a number of commands

b and c

Interface	Advantages	Disadvantages
Graphical user interface (GUI)	The user doesn't need to learn any commands. It is more user-friendly; icons are used to represent applications. A pointing device (such as a mouse) is used to click on an icon to launch the application – this is simpler than typing in commands OR a touch screen can be used where applications are chosen by simply touching the icon on the screen.	This type of interface uses up considerably more computer memory than a CLI interface. The user is limited to the icons provided on the screen. It needs an operating system, such as Windows, to operate, which uses up considerable memory.
Command line interface (CLI)	The user is in direct communication with the computer. The user is not restricted to a number of pre-determined options. It is possible to alter computer configuration settings. It uses a small amount of computer memory.	The user needs to learn a number of commands to carry out basic operations. All commands need to be typed in which takes time and can be error-prone. Each command must be typed in using the correct format, spelling, and so on.

- 5
- a C – an area in memory that temporarily holds data
 - b B – software that communicates with the operating system and translates data into a format that can be printed out
 - c C – allocating memory to competing applications running on a computer system
 - d D – multitasking
 - e A – command line interface (CLI)
 - f C – a GUI interface makes it easier to use the computer
 - g C – interrupt
 - h D – CMOS
 - i A – any device plugged into the USB port of a computer must have a unique serial number
 - j B – post-WIMP interfaces make use of the more modern optical mouse to select icons
- 6
- a
 - A compiler produces a file containing a translated machine-code program; an interpreter does not.
 - An interpreter executes a program written in a high-level language by translating then executing each line of the program, provided there are no errors in that line.
 - A compiler does not execute the program.
 - b Advantage – compiled programs are smaller in size; source code not included in compiled file. Disadvantage – longer development time if compilers are used whilst developing code.
 - c Advantage – easier to edit programs during development. Disadvantage – programs cannot run without the interpreter.
- 7
- A compiler translates a high-level language into machine code, whilst an assembler translates a low-level assembly language into machine code. One assembly language instruction usually translates to one machine code instruction, whereas one high-level language instruction usually translates to many machine code instructions.
- 8
- a An Integrated Development Environment (IDE) is software that is used by programmers to aid the writing, editing and development of programs.
 - b Auto-completion means that an IDE can automatically include matching keywords when the first keyword is typed. For example, when `IF` is written in Visual Basic, the IDE automatically adds the keywords: `End If`
 Auto-correction means that an IDE can automatically correct errors, for example, underlining the places where syntax errors occur and offering the corrected statement to use.
 Prettyprinting means colour-coding words and adjusting the layout of a program for readability, for example, always showing reserved words in orange and strings in red.
 - c
 - A debugger to test a program in a controlled environment. For example, a separate report window can be used to display the values of each variable as the program is running.
 - A code editor to type the program and correct errors means that there is no need to exit the IDE for every alteration during development.

- 9 As the program has already been written it can be translated using a compiler as the development has already been done. This means that there would be an executable program available in binary that can be run on his friend's computer without the use of any additional software. Pedro knows that his friend's internet connection is very slow, and the compiled program is smaller than the original program so there will be less data to transmit, which means that it will take less time for the program to arrive and the transmission is more likely to be successful.