

ICT - Information and Communications Technology

**ICT30115**

Cert. 3 in Information, Digital Media and Technology

Unit

ICTSAS301

Run standard diagnostic tests

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SAMPLE ONLY*

Trainer/Teacher Manual



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LANE

## STUDENT/TRAINEE DETAILS

**Student/Trainee Name****Student/Trainee Email****Teacher / Trainer Name****School / Institution / Training Organisation / Employer**

SAMPLE SAMPLE

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## INTRODUCTION

This manual is developed to provide training content that addresses the specific 'Unit of Competency' as outlined on the following pages.

It provides the teacher and/or trainer with a document that includes all that the student and/or trainee manual content plus guidance notes as well as answers to the learning activities in the student/trainee manual.

This manual can be packaged with various manuals addressing other 'Units of Competency' in order to meet the 'Packaging Rules' of a particular Australian Training Package Qualification.

This resource has been designed to be delivered in a form that is conducive to the learning environment including:

- ☆ Online delivery
- ☆ Classroom delivery
- ☆ On the job training

The documents are designed in a 'landscape' format in order to make reading on a computer screen easier as well as reduces the need to scroll down pages. Documents can be easily printed if the learning environment requires the student or trainee to have hard copies of the learning materials.

## INTRODUCTION—CONT'D

### LEARNING ACTIVITIES

The learning activities in the student and/or trainee manuals are 'Form Enabled' so that if the resources delivered online, the activities can be filled in using the computer keyboard.

Each learning activity is identified with the following icon.

**Learning  
Activity**

Learning activities come in the following forms.

- ☆ Questions
- ☆ Research
- ☆ Tasks
- ☆ Interviews

#### ***Questions***

Questions would relate to the information presented on previous pages.

#### ***Research***

This type of learning activity would require the student or trainee to locate information by using research methods. The information they would be required to locate would be in line and/or support the information that the manual had outlined in previous pages.

## INTRODUCTION—CONT'D

### **Tasks**

This learning activity type would require the student/trainee to actually do or undertake something and would be reinforcing the knowledge they have gained from reading the manual's previous pages.

### **Interviews**

This learning activity type would require the student/trainee to interview person(s) in an actual workplace environment or a person(s) who are experienced in the industry sector which the student/trainee is currently undergoing training.

The student/trainee is made aware of the type of learning activity by noting the learning activity type displayed under the learning activity icon.

**Learning  
Activity**

Research

### **SELF ASSESSMENT**

At the end of each manual is a series of questions that the student/trainee should review and answer.

This self assessment is to ensure in the student's or trainee's mind that they have reviewed and understood the information that was presented in their manual.

If they are unsure of their understanding in any of the topics reviewed, they are encouraged to go back and review the information again and/or seek the assistance of their teacher or trainer.

## LANE

## UNIT OF COMPETENCY OVERVIEW

The following pages are extracts from Training.gov.au website and outlines this specific 'Unit of Competency' including the 'Elements' and the 'Performance Criteria'. The content within this manual has been developed to address this unit.

## ICTSAS301 - RUN STANDARD DIAGNOSTIC TESTS

ELEMENT	PERFORMANCE CRITERIA
<b>1. Identify common symptoms and preventative maintenance techniques</b>	1.1 Develop a troubleshooting process to help resolve problems 1.2 Determine the specific symptoms relevant to different types of hardware, operating system and printer problems 1.3 Identify common preventative maintenance techniques to support maintenance strategies
<b>2. Operate system diagnostics</b>	2.1 Run the system diagnostic program according to specification 2.2 Modify the system configuration as indicated by the diagnostic program 2.3 Carry out preventative maintenance in line with organisational guidelines
<b>3. Scan system for viruses</b>	3.1 Scan the system to check and maintain virus protection 3.2 Report identified viruses to an appropriate person 3.3 Remove virus infections found by the scan using software tools and procedures, or by restoring backups 3.4 Document relevant symptom and removal information
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# Section One

## Identify Common Symptoms and Preventative Maintenance Techniques

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# RUN STANDARD DIAGNOSTIC TESTS

## SECTION ONE—IDENTIFY COMMON SYMPTOMS AND PREVENTATIVE MAINTENANCE TECHNIQUES

### INTRODUCTION

Often computer problems can be easily solved if the symptoms of the problems are clearly identified as well as understood.

Also, in order to maintain an efficiently operating PC or computer system, it requires certain preventative tasks.

We look at both of these topics in this section.

### SECTION LEARNING OBJECTIVES

At the completion of this section you will learn information relating to:

- ☆ Developing a troubleshooting process to help resolve problems
- ☆ Determining the specific symptoms relevant to different types of hardware, operating system and printer problems
- ☆ Identifying common preventative maintenance techniques to support maintenance strategies



## DEVELOP A TROUBLESHOOTING PROCESS TO HELP RESOLVE PROBLEMS

Diagnosing faults with information technology such as computers can be exceedingly challenging because most of the workings of digital technology cannot actually be seen. This is unlike the situation in the analogue world where problems can usually be physically observed. If a car tyre is flat – you can see it. If a house window is broken -- you can see it. If a light bulb is burned out – you can see it.

This means that you must adopt an analytical approach based upon a good understanding of computer systems in order to try to logically discover computer faults.

The designers of computers and computer software go to great lengths to make their products seem simple to use. However this ease of use disguises the fact that this technology is astoundingly complex, delicate and sophisticated.

This means that when faults do occur there may be several possible reasons for them. It is, of course, true that some of these problems can be caused by computer viruses – and these will be discussed later in this unit. However, it is usually incorrect to immediately assume that a fault must be caused by a computer virus in the absence of any clear reason to think so; although it is sometimes difficult to distinguish hardware or software faults from the problems which actually are caused by computer viruses.

But as Murphy's Law of computer servicing reminds us:

***'Because a computer simply behaves oddly, it does not mean that it has a virus.'***



The general systemic approach to fault finding that we will follow in these pages could be applied whenever you do not know the reason for a fault – assuming that you have no reason to suspect a virus to start with.

Following such a logical process, which is based upon our knowledge of how hardware and software work together, can help technicians find the actual causes of faults as efficiently as possible.

Workplaces with well managed information technology IT operations will likely have similar established procedures for diagnosing computer faults.

But IT professionals often have to diagnose faults with other peoples' computers – not just their own.

When you are responding to a service request by another computer user you need to be thorough and systematic in obtaining relevant details from them.

A good checklist to follow would be as follows:

- ☆ Ask them to explain exactly what they were doing when the problem occurred.
- ☆ Ask them to note the time and date when they first noticed the problem.
- ☆ Ask them to list all of the software applications that were running at the time the problem occurred. This will help determine if the problem was software related.
- ☆ Ask them to identify any error messages which appeared on their screen. This will help determine whether the problem was hardware or software related.
- ☆ Ask them if they have recently installed any new hardware or software. This will help determine if some software code has conflicted with an operating system.
- ☆ Ask them if the problem has happened before. This will help find any records which could be used to assist with diagnosing the problem.

**Learning  
Activity**

## Question

**LEARNING ACTIVITY ONE**

When you are responding to a service request by another computer user you need to be thorough and systematic in obtaining relevant details from them. What six questions would a good checklist have that should be asked as outlined in this section?


SAMPLE SAMPLE

**TEACHER / TRAINER GUIDANCE NOTES**

When you are responding to a service request by another computer user you need to be thorough and systematic in obtaining relevant details from them. A good checklist to follow would be as follows:

- 1) Ask them to explain exactly what they were doing when the problem occurred.
- 2) Ask them to note the time and date when they first noticed the problem.
- 3) Ask them to list all of the software applications that were running at the time the problem occurred. This will help determine if the problem was software related.
- 4) Ask them to identify any error messages which appeared on their screen. This will help determine whether the problem was hardware or software related.
- 5) Ask them if they have recently installed any new hardware or software. This will help determine if some software code has conflicted with an operating system.
- 6) Ask them if the problem has happened before. This will help find any records which could be used to assist with diagnosing the problem.



## **DETERMINE THE SPECIFIC SYMPTOMS RELEVANT TO DIFFERENT TYPES OF HARDWARE, OPERATING SYSTEM AND PRINTER PROBLEMS**

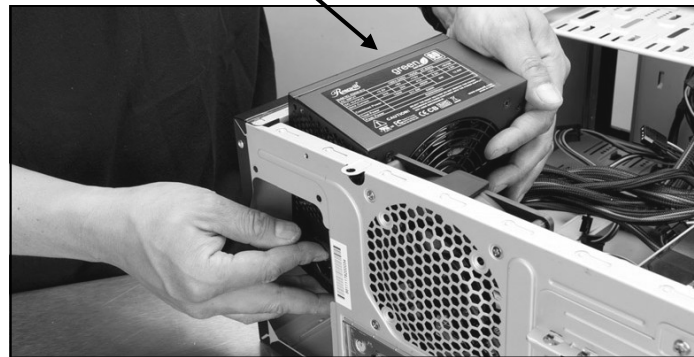
Perhaps one of the most common problems that occurs with a computer is simply that it will not turn on. A logical procedure to diagnose the problem with such a computer might be as follows:

- ☆ Check that the power cord is plugged into the wall socket; that the socket is switched on, and that the other end of the cord is plugged securely into the computer. This is the most likely explanation for the power supply problem.
- ☆ However if that is not the problem, visually inspect the socket and cord for any smoke, sparks or smells. Do not attempt to touch or fix any faulty socket. Rather, turn off the power to the socket if possible, and notify your supervisor and the occupational health and safety (WHS) officer immediately. Also, place a tag on the socket warning others that it may be unsafe.
- ☆ If the computer still will not start after the socket has been repaired, check that the circuit breaker for the circuit to which the computer is attached has not been tripped (or that the fuse is not blown). Make sure you do this in accordance with WHS procedures. To confirm that the circuit is not broken, you could plug something else that you know is working into the socket, such as a lamp, to see if it works.
- ☆ Next, after you are satisfied that the circuit is not broken, try substituting the computer power cord with a new one which you know works correctly to see if the computer then begins to work.

After all of those steps are tried, if the computer still won't start, it is most likely that a problem exists with the computer's power supply and/or possibly the motherboard (also called the circuit board).

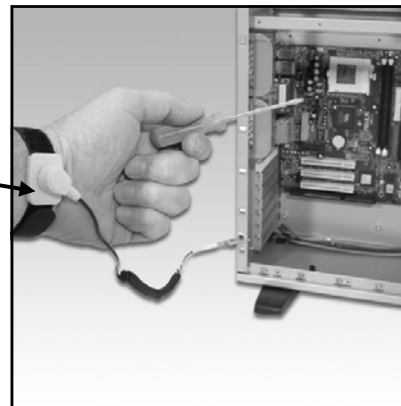
Never try to repair a faulty power supply. Very high voltage electrical charges can occur inside power supply units. Internal problems with power supplies should therefore only be dealt with by trained technicians.

**PC Power supply**



However if you do suspect that a power supply is faulty, the easiest way to confirm or disprove the theory is to substitute it with another which you know to be working correctly. Make certain you follow WHS practices when doing any such work inside a computer's case. Such precautions include turning the power off and disconnecting the power cord, and wearing a static discharge strap. Your sensitive computer components such as the Processor (CPU), hard drive, memory, main board chips and expansion cards could be severely damaged by static electricity. Your body carries static electricity, so by wearing a static discharge strap this static electricity is discharged away from any sensitive computer components.

**Static discharge strap**



If you establish that you have a fully functioning power supply to the computer but it still will not start, it is likely that the fault lies with the motherboard.

Motherboards are large and complex and accurately finding faults in them is a specialist's job beyond the scope of this unit. However it is possible for a non-technician to use special mother board test cards such as the 'Motherboard Test Card', also known as a 'POST Card'.

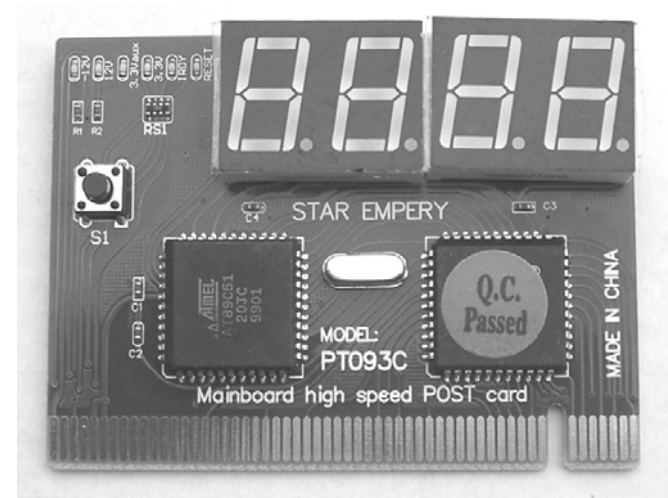
There are ones for desktop PCs and ones for Laptops.

This card shows self-test codes and signals the power supply status when the system power is switched on, even with a system that won't boot. If a failure is detected by the system self-test, it will halt and the failing test number will be shown on the test card display.

You may then look up the meaning of the number in the test card's manual to see why the system did not boot. We look at using POST cards later.



**Laptop Motherboard test card**



**Desktop PC Motherboard test card**

When all steps have been taken to ensure that the computer motherboard is receiving its correct power supply, you can move on to consider other possible causes of problems with the system.

It might seem silly to suggest that you next check that all the parts of the computer are actually present. However, don't assume that all components that should be attached to the computer are actually physically present. Theft of components in some organisations -- particularly in schools - is common. So, check that the CPU, the hard disk and the random access memory (RAM) in particular are actually installed.

If everything is accounted for, do not overlook the possibility that some peripherals devices might not be connected. Check the keyboard, monitor and mouse connections in particular as they are often jiggled loose. Internal cables to hard drives, power supplies, fans, and disk drives can also occasionally work loose – especially if the computer has been moved around.

If all components are present and connected, you next need to consider that some of them may not be working correctly. One reason for such problems is a dirty computer. Computer fans suck air into the case and then deposit dust and fluff onto the components attached to the motherboard. This accumulated dirt builds up its own static electricity charge which can alter the function of some delicate components. It can also form a layer of insulation over some components which can cause them to overheat and malfunction. Even worse, it can become a source of combustion.

The preferred method of removing this dust is to use a small technician's vacuum cleaner, making sure not to touch any of the components with the vacuum and making sure to use an electrostatic discharge wrist strap as mentioned earlier.



**Learning  
Activity**

## Research

**LEARNING ACTIVITY TWO**

In this activity you are to do some research and locate two suppliers that supply:

Anti static wrist bands

Battery powered computer vacuums

**TEACHER / TRAINER GUIDANCE NOTES**

This activity will expose the student or trainee to various suppliers of computer maintenance products.

SAMPLE SAMPLE

**Learning  
Activity**

## Question

**LEARNING ACTIVITY THREE**

What is the very first thing that you should check if a computer will not turn on?

***TEACHER / TRAINER GUIDANCE NOTES***

You need to check and see if it is plugged into the power point and that the power point is clicked on.

SAMPLE SAMPLE

**Learning  
Activity**

## Task

**LEARNING ACTIVITY FOUR**

Using the information that was provided over the last few pages, we want you to develop your own troubleshooting checklist.

One completed, present it to your teacher or trainer for review and discussion.

***TEACHER / TRAINER GUIDANCE NOTES***

This Performance Criteria was simply a review of steps that a person would likely need to go through in order to hopefully locate a PC problem.

This information works nicely as the basis for a troubleshooting checklist, hence the basis of this activity and it also gives the student or trainee an opportunity to review the information while creating the checklist.



## IDENTIFY COMMON PREVENTATIVE MAINTENANCE TECHNIQUES TO SUPPORT MAINTENANCE STRATEGIES

There are many types of computer maintenance techniques that should be considered that will keep a clients' computer efficient and problem free.

Earlier we mentioned keeping the internal hardware clean. This maintenance task should occur on a regular basis.

It should include cleaning the dust off the fan inlets that are part of the computer case. There are two inlets. One that allows air to be sucked in to cool the power supply and the other to allow air to be sucked in by the motherboard cooling fan. These inlets can get clogged and this prevents air from flowing efficiently, causing the PC internal hardware to overheat and fail.

Internal components such as the motherboard, graphics card and other circuit boards should get a simple vacuum to remove dust. This dust if it accumulates, can cause the circuit boards to experience signalling failures.

The fan blades often need a bit of cleaning and a cotton bud is ideal for this.

Also, the case walls should be vacuumed.

A simple but very important maintenance technique is to have the PC and all connected devices draw electrical power through 'surge protection' power boards. In the event of unexpected power surges (often happen in storms), these power boards will switch off the computer and devices to prevent the electrical surge from burning out the PC circuit boards and the device components.

Check cables and cable connectors on a regular basis to ensure they are in good condition. This task will also force you to ensure the cables are properly connected.

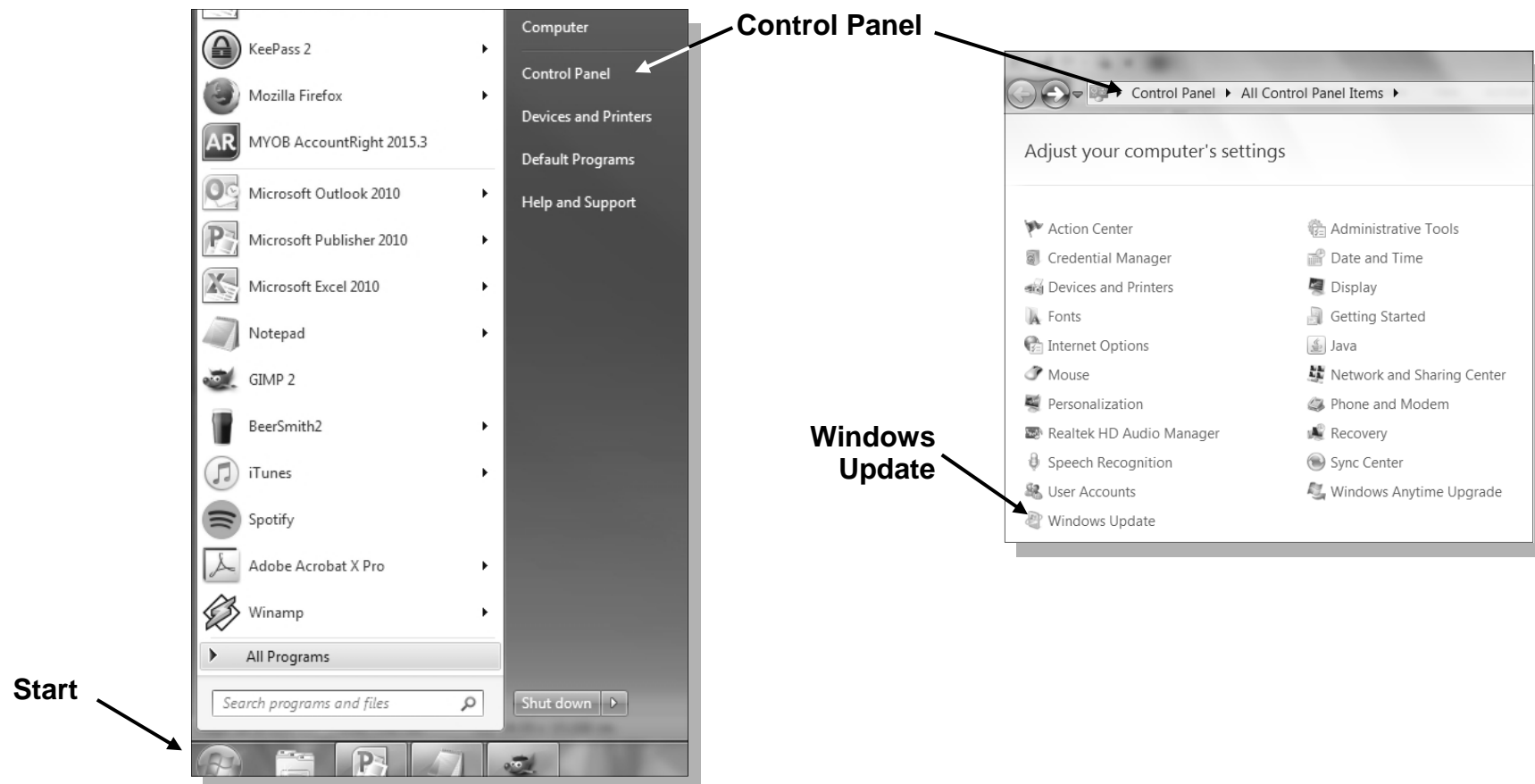
SAMPLE SAMPLE

## SOFTWARE UPDATES

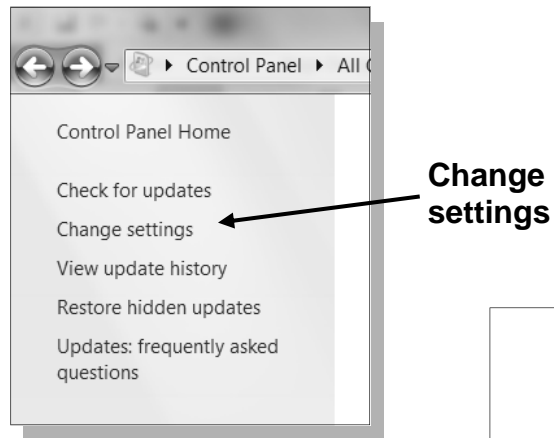
Today, new versions of operating system software and updates are the norm. It is always recommended that a check of operating system updates should be scheduled regularly. Many popular operating systems such as Windows have a feature that allows the computer to receive automatic updates.

This includes the automatic installation of the updates and the re-configuration of the computer to accommodate the updates.

If a PC is running Windows 7, the automatic OS software update details can be reviewed by going to the Windows 'Start' button and then the 'Control Panel'. Then click on 'Windows Update'.



On the new window you click on 'Change Settings'. This is where you would check and make sure the automatic operating system updates feature is enabled. The example below is what your screen should look like if the automatic update function is enabled.



### Choose how Windows can install updates

When your computer is online, Windows can automatically check for important updates and install them using these settings. When new updates are available, you can also install them before shutting down the computer.

How does automatic updating help me?

#### Important updates



Install updates automatically (recommended)

Install new updates: Every day

at 3:00 AM

#### Recommended updates

☒ Give me recommended updates the same way I receive important updates

#### Who can install updates

☒ Allow all users to install updates on this computer

#### Microsoft Update

☒ Give me updates for Microsoft products and check for new optional Microsoft software when I update Windows

## WINDOWS 10 UPDATES

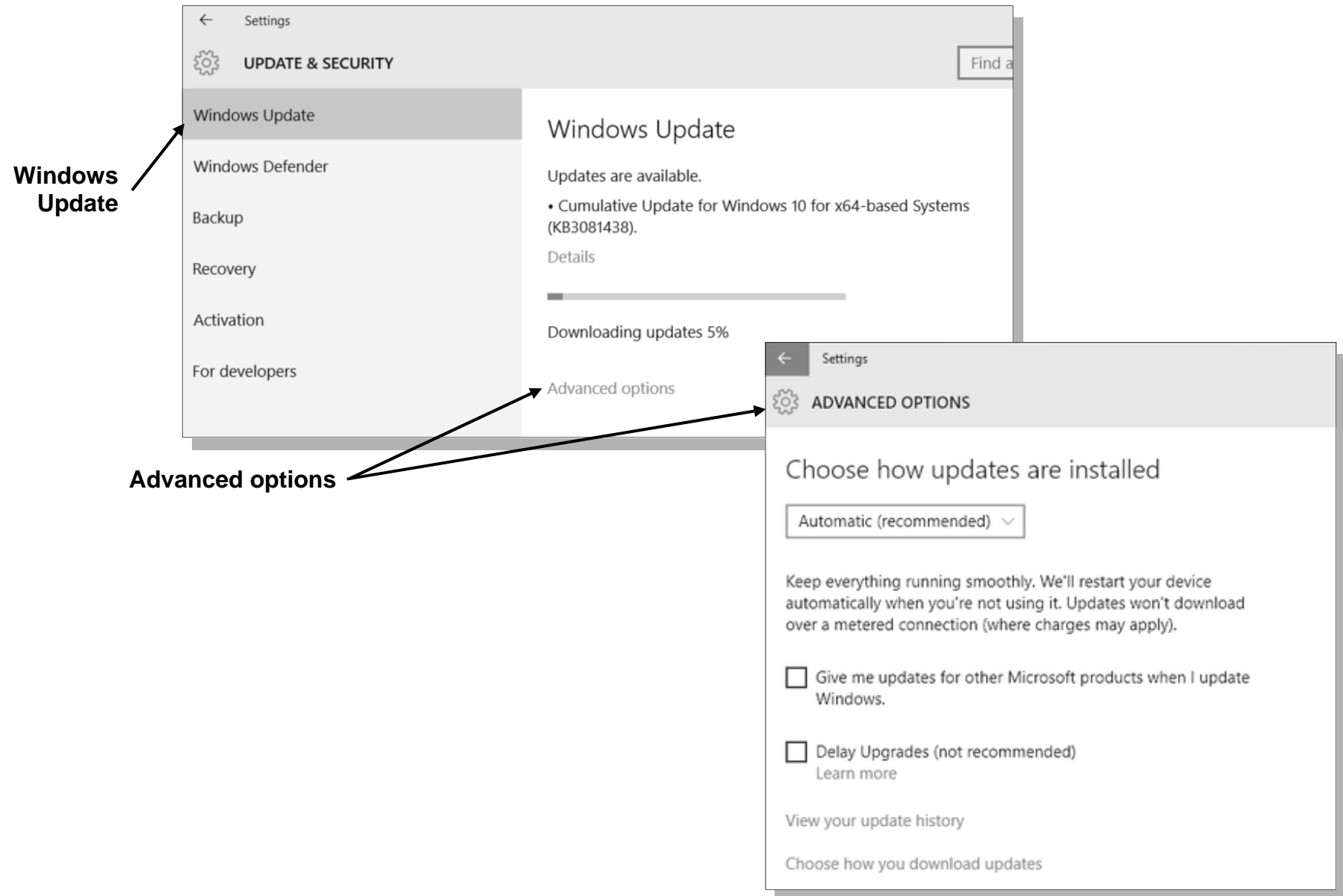
Windows 10 also has an automatic operating update feature.

Unlike Windows 7, Windows 10 will not download updates over a metered internet connection to avoid the PC user from being charged high download fees. However, it informs the user that updates are available and allows the user to make the choice of downloading the updates using the metered connection, or waiting until they are able to use a non-metered internet connection.

To view Windows 10 update details you go to the Windows 'Start' button and click on 'Settings'. Then you click on 'Update & security'.

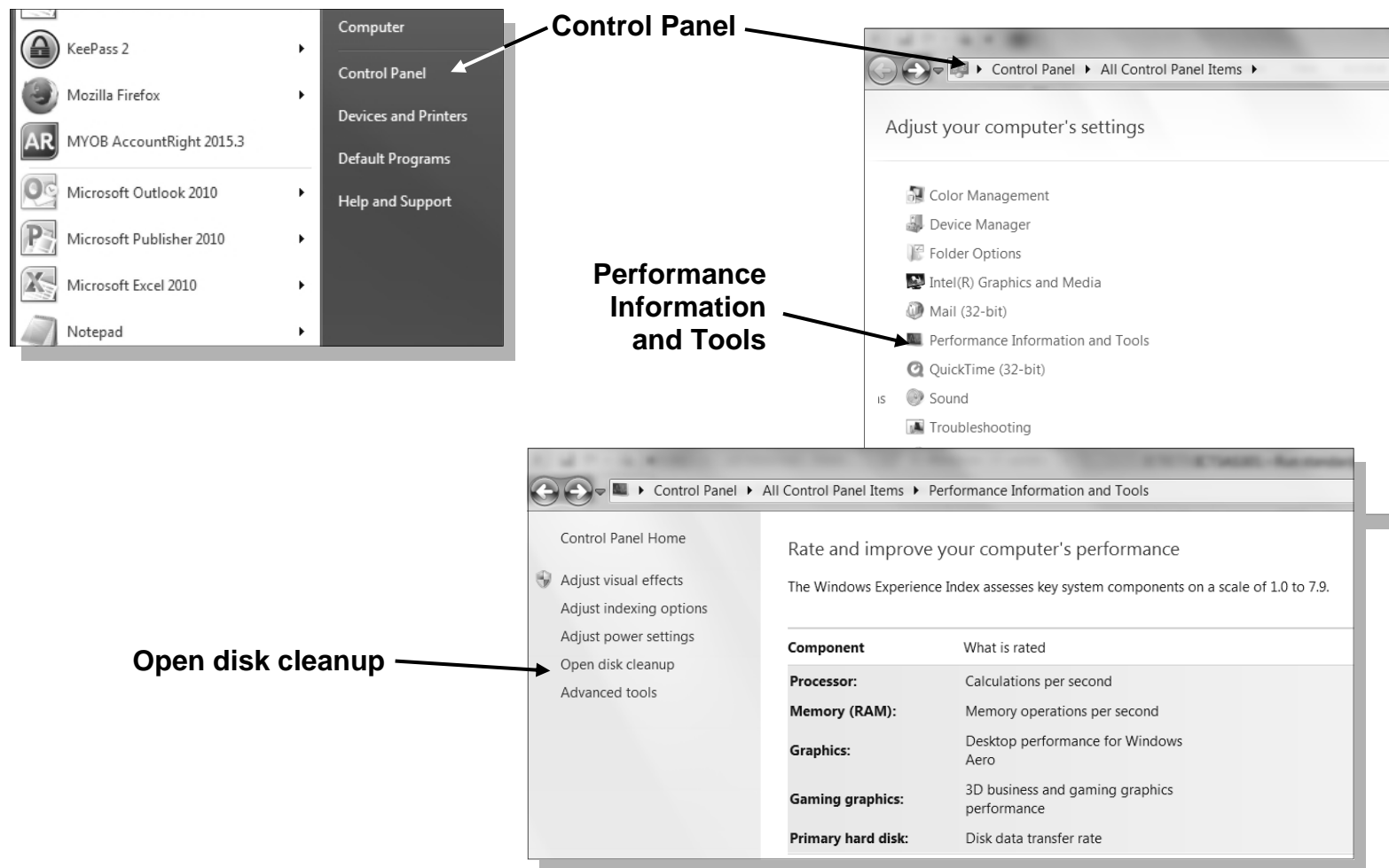


On the next screen you click on 'Windows Update and then click on 'Advanced options'. On the next screen the settings should be as they are in the example below.

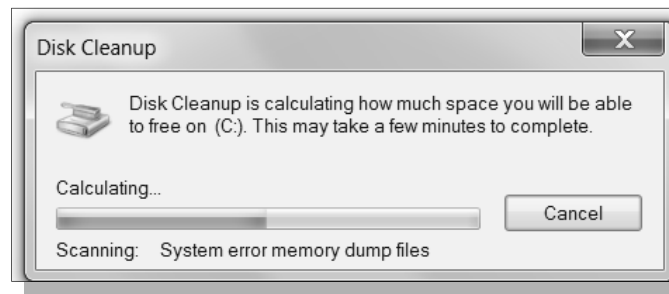


## OPERATING SYSTEM MAINTENANCE TOOLS (WINDOWS 7)

Windows 7 comes with a series of 'Diagnostic Tools' that are used to perform maintenance tasks. One tool can be found in the 'Control Panel' by selecting 'Performance Information and Tools' and by clicking on 'Open disk cleanup'.



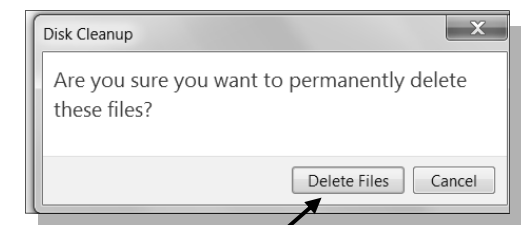
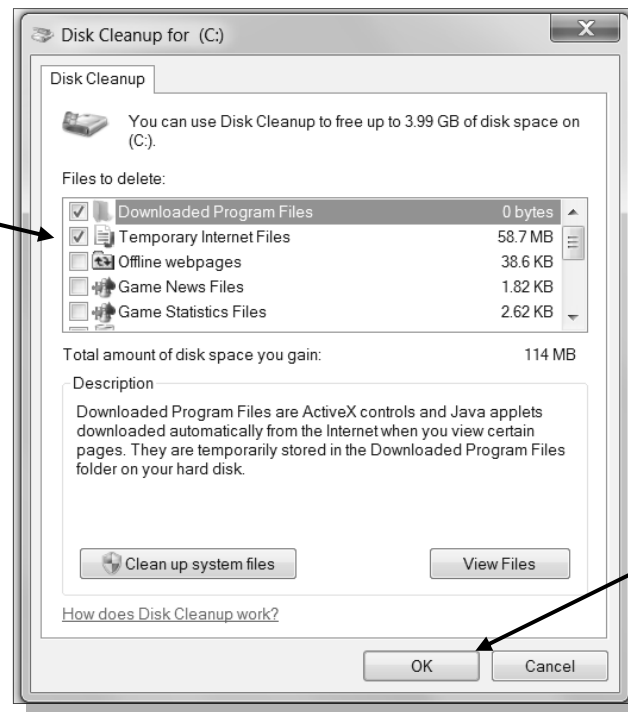
This prompts the operating system to analyse the hard drive and this is indicated with a progress window that appears.



Moments later the operating system will produce a report showing what files could be deleted to create more space on the hard drive resulting in an increase in system performance. If you want to take the recommended cleanup steps you would click 'OK'.

You are asked to confirm you want to continue and if so, you click 'Delete files' and the disk cleanup is completed.

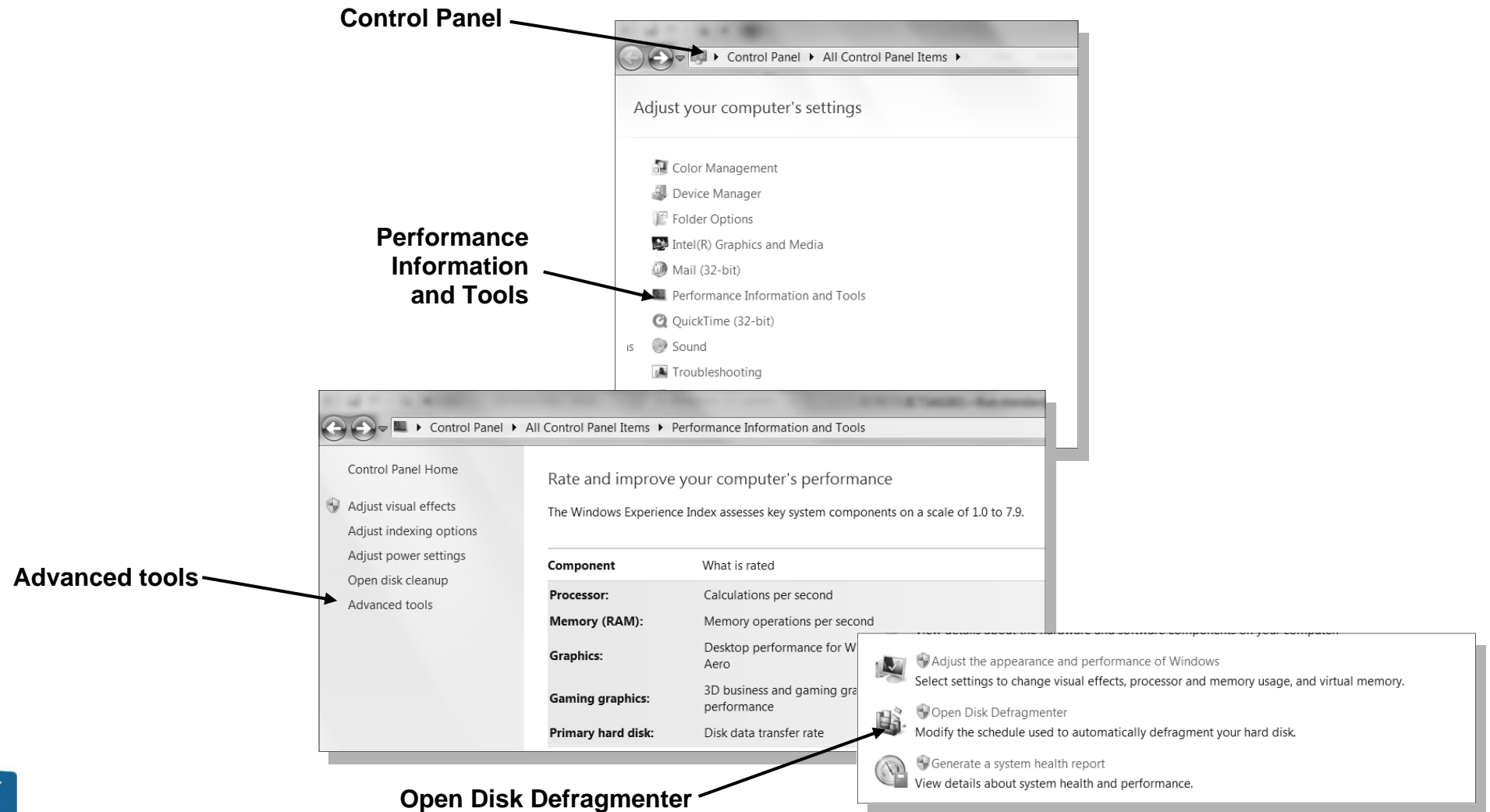
**Recommendations**



**Delete files**

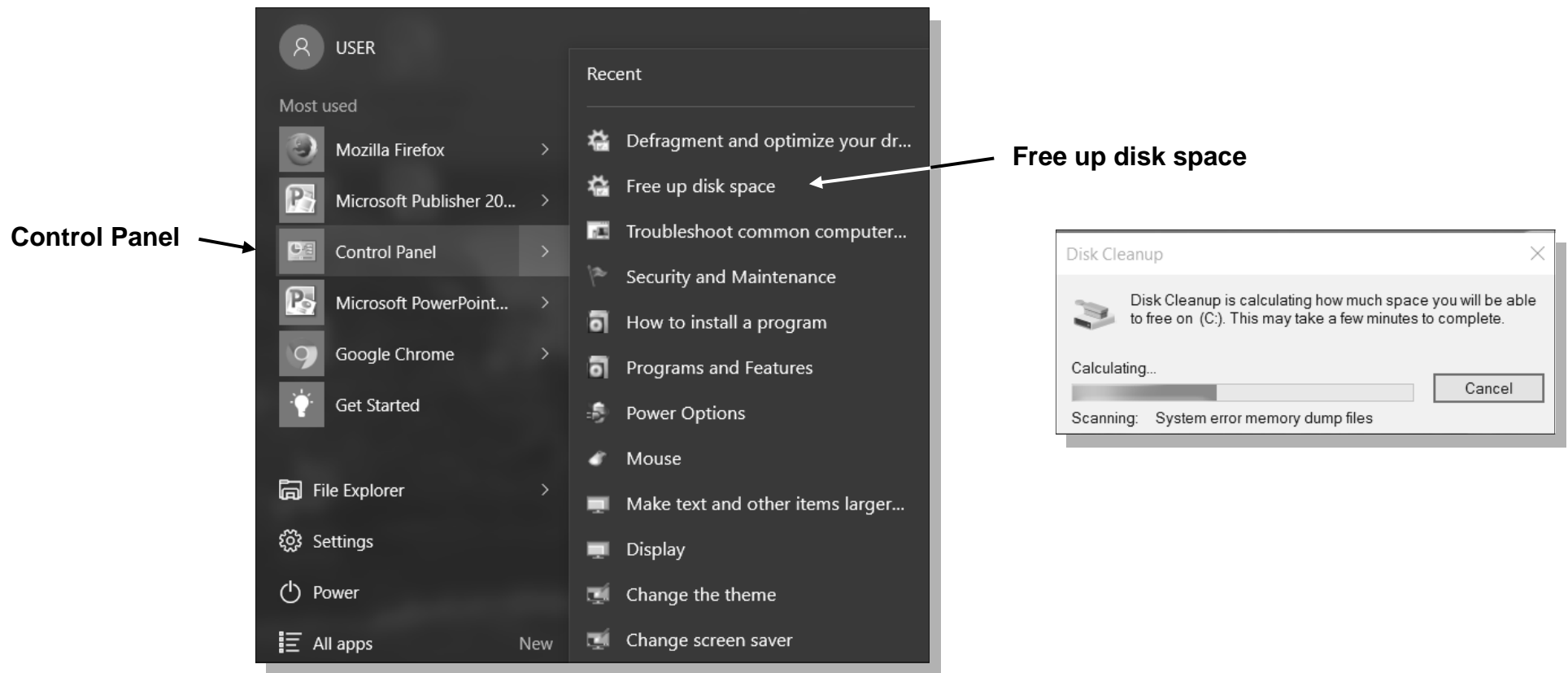
**OK**

Now you go back to the 'Control Panel' and click again on 'Performance Information and Tools', but this time you click on 'Advanced tools'. On the next window is another type of system maintenance tool called 'Open Disk Defragmenter'. We will learn how to use this tool in the next section of these training materials.



## OPERATING SYSTEM MAINTENANCE TOOLS (WINDOWS 10)

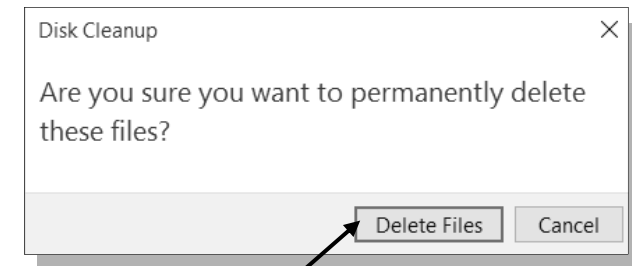
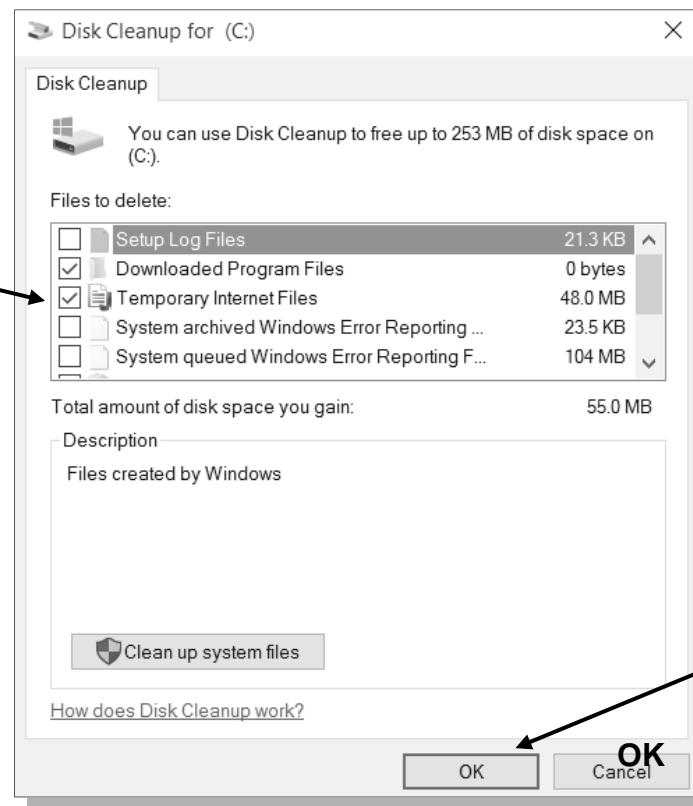
Windows 10 comes with a series of 'Diagnostic Tools' that are used to perform maintenance tasks. One tool can be found in the 'Control Panel' by selecting 'Free up disk space'. This prompts the operating system to analyse the hard drive and this is indicated with a progress window that appears.



Moments later the operating system will produce a report showing what files could be deleted to create more space on the hard drive resulting in an increase in system performance. If you want to take the recommended cleanup steps, you would click 'OK'.

You are asked to confirm you want to continue and if so, you click 'Delete files and the disk cleanup is completed.

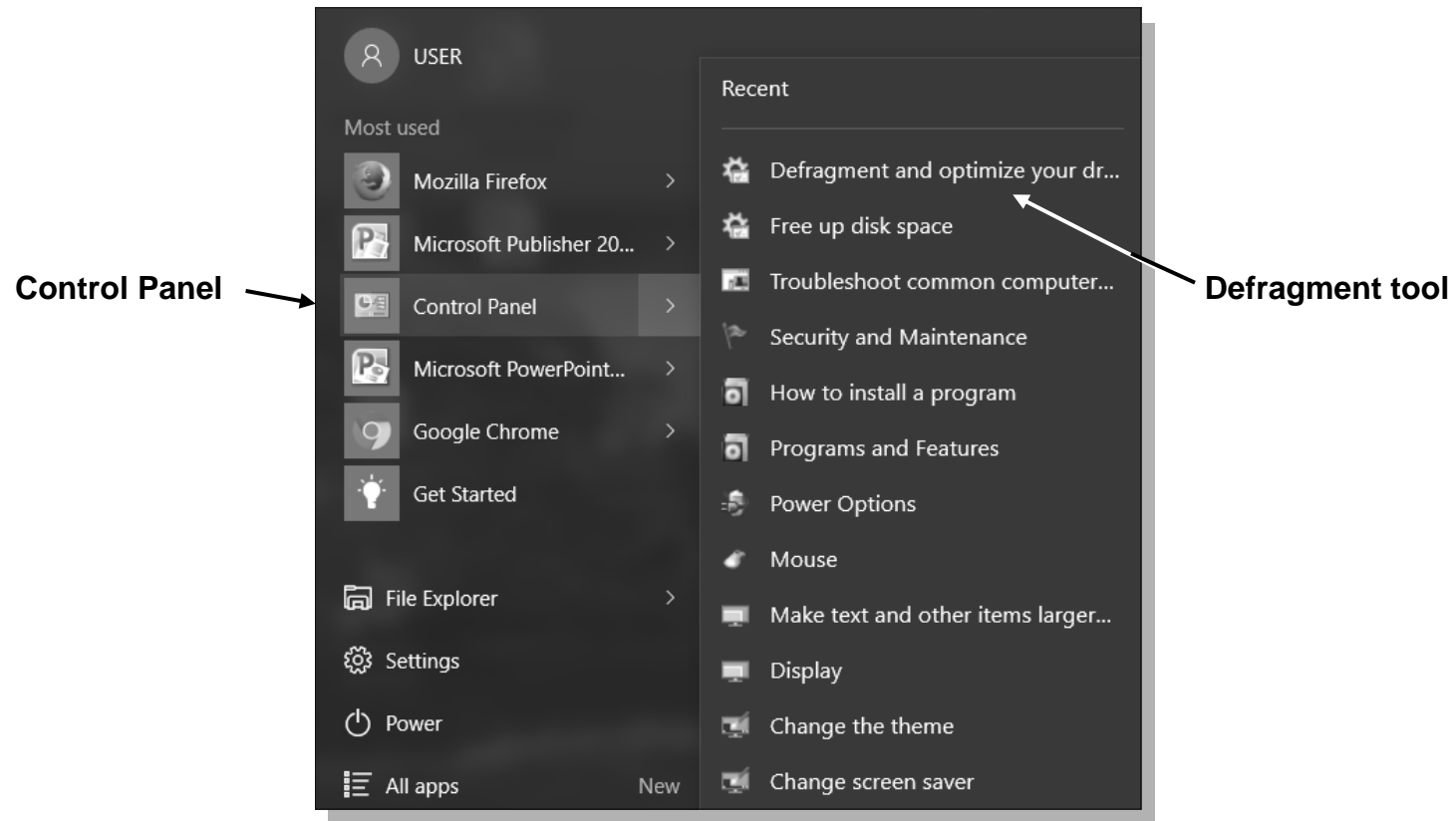
Recommendations



Delete files

OK

If you go back to the 'Control Panel' you will see another type of system maintenance tool called 'Defragment and optimise...' tool. We will learn how to use this tool in the next section of these training materials.



**Learning  
Activity**

## Task

**LEARNING ACTIVITY FIVE**

In this activity you are to locate the various maintenance tools on your PC.

This activity should be done in front of your teacher or trainer. If you are doing this at work or at home, you will need someone to observe you performing this activity. These persons observing you doing this activity will need to have the skills themselves to do this activity so that they can confidently say you have performed this activity successfully.

Your teacher or trainer will likely require some type of evidence that you have performed this activity successfully and your teacher or trainer will let you know as to what form this evidence will need to be.

***TEACHER / TRAINER GUIDANCE NOTES***

This is a practice exercise. It helps to reinforce the knowledge that the student has gained in this section. It is best if the student or trainee was able to do this while the teacher or trainer watches.

If the student or trainee is undertaking this course at a workplace, then the employer or the supervisor could provide evidence that they observed the student or trainee perform this activity successfully.

**Learning  
Activity**

## Interview

**LEARNING ACTIVITY SIX**

In this activity we want you to interview six persons that use a PC at work. We want you to ask each person if they or someone in their workplace has ever (that they can recall) opened the computer case and cleaned the inside of their computer.

Compile your interview results in report form and tell us the first name of each person, their age and what they do at work.

Once your report has been completed, present it to your teacher or trainer for review and discussion.

***TEACHER / TRAINER GUIDANCE NOTES***

The likely result of their interview activity will be that most have never observed their computer being cleaned inside.

It would be interesting to find out if the student or trainee has ever cleaned the inside of their own desktop PC.

# Section Two

## Operate System Diagnostics

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## TOPIC SUB-DIRECTORY

Over the next several pages there will be topics that address specific features, functions and tools available and used in Windows 7 and Windows 10.

To enable the student or trainee to locate these specific topics, we have introduced this sub-directory.

<i>POST Tests</i>	Page 34	<u><i>(Student/Trainee Manual Page 31)</i></u>
<i>Windows 7 Diagnostic Tools</i>	Page 44	<u><i>(Student/Trainee Manual Page 41)</i></u>
<i>Windows 7 Troubleshooting</i>	Page 44	<u><i>(Student/Trainee Manual Page 41)</i></u>
<i>Windows 7 Disk Cleaning</i>	Page 49	<u><i>(Student/Trainee Manual Page 67)</i></u>
<i>Windows 7 Disk Defragmentation</i>	Page 51	<u><i>(Student/Trainee Manual Page 49)</i></u>
<i>CHKDSK Utility in Windows 7</i>	Page 55	<u><i>(Student/Trainee Manual Page 53)</i></u>
<i>Windows 7 Memory Test</i>	Page 59	<u><i>(Student/Trainee Manual Page 56)</i></u>
<i>Windows 10 Diagnostic Tools</i>	Page 63	<u><i>(Student/Trainee Manual Page 61)</i></u>
<i>Windows 10 Troubleshooting</i>	Page 64	<u><i>(Student/Trainee Manual Page 63)</i></u>
<i>Windows 10 Disk Cleaning</i>	Page 68	<u><i>(Student/Trainee Manual Page 66)</i></u>
<i>Windows 10 Disk Defragmentation</i>	Page 71	<u><i>(Student/Trainee Manual Page 68)</i></u>
<i>CHKDSK Utility in Windows 10</i>	Page 75	<u><i>(Student/Trainee Manual Page 73)</i></u>
<i>Windows 10 Memory Test</i>	Page 78	<u><i>(Student/Trainee Manual Page 75)</i></u>
<i>System Configuration Modifications</i>	Page 82	<u><i>(Student/Trainee Manual Page 79)</i></u>
<i>Preventative Maintenance</i>	Page 84	<u><i>(Student/Trainee Manual Page 71)</i></u>

# RUN STANDARD DIAGNOSTIC TESTS

## SECTION TWO—OPERATE SYSTEM DIAGNOSTICS

### INTRODUCTION

In this section we will take some time to learn about the common diagnostic tools that are provided by most operating systems.

As you are aware, there are many types of operating systems and each has its own tools. However, in this section we will focus on Windows 7 and Windows 10 diagnostic tools.

### SECTION LEARNING OBJECTIVES

At the completion of this section you will learn information relating to:

- ☆ Running the system diagnostic program according to specification
- ☆ Modifying the system configuration as indicated by the diagnostic program
- ☆ Carrying out preventative maintenance in line with organisational guidelines

**RUN THE SYSTEM DIAGNOSTIC PROGRAM ACCORDING TO SPECIFICATION****AND****MODIFY THE SYSTEM CONFIGURATION AS INDICATED BY THE DIAGNOSTIC PROGRAM****AND****CARRY OUT PREVENTATIVE MAINTENANCE IN LINE WITH ORGANISATIONAL GUIDELINES**

*(Over the next few pages we cover three 'Performance Criteria' points at the same time to avoid repetition)*

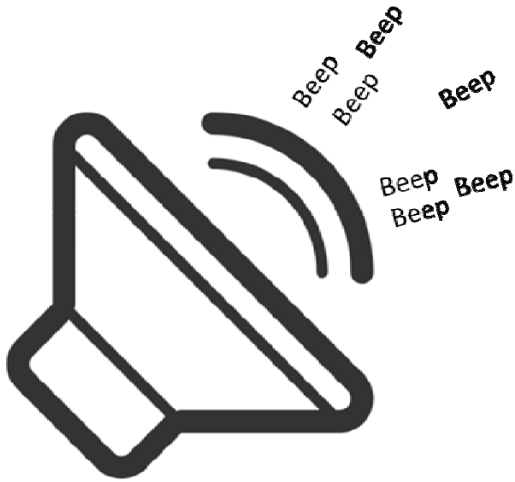
Because we cannot physically see most of the workings of computer hardware and software, we must often rely upon such various software utilities to investigate the machine and report faults to us.

So, when you have established that all the components are present, connected, and are not excessively dirty, your next logical line of attack might well be to check the 'power on self test' (POST) and system beep codes.

When a computer is first turned on, the basic input / output system (BIOS) performs a POST as part of the starting up (i.e. boot) process. (Booting is also known as bootstrapping or initial program loading.)

The table below describes the main 'boot' steps.

1	<ul style="list-style-type: none"> <li>•Motherboard</li> <li>•Electrical power checked by motherboard which, in turn, signals CPU</li> </ul>
2	<ul style="list-style-type: none"> <li>•CPU</li> <li>•Automatically contacts BIOS</li> </ul>
3	<ul style="list-style-type: none"> <li>•BIOS</li> <li>•Performs POST</li> </ul>
4	<ul style="list-style-type: none"> <li>•Adapter cards such as audio and video cards</li> <li>•Execute ROM code which is stored on themselves</li> </ul>
5	<ul style="list-style-type: none"> <li>•BIOS</li> <li>•Finds Master Boot Record (MBR) on the device set as the first boot device -- usually the C: hard drive</li> </ul>
6	<ul style="list-style-type: none"> <li>•Operating system boot loader</li> <li>•Takes control and starts to load the operating system</li> </ul>
7	<ul style="list-style-type: none"> <li>•Operating system</li> <li>•Loads and takes control of system and performs checks of all hardware attached to CPU</li> </ul>
8	<ul style="list-style-type: none"> <li>•Application software programs</li> <li>•Loaded as required by users and accesses hardware and CPU via the operating system</li> </ul>



However, the POST conducts only basic hardware tests. For example it would only detect if a hard drive and CD/DVD drive were present and appeared to be operational. It would not diagnose any problems that might occur with them.

At the end of the POST, the computer plays an audible beep through either the PC's internal speaker or through speakers attached to the sound card. If the POST completes successfully without detecting any problems with the system, it will typically play a single short beep to let you know the test is complete. The computer will then continue to start up and load the operating system.

But, if the POST does detect any errors with any hardware devices, it reports them in various ways depending upon which stage of the boot process it is at.

If it needs to report an error before the monitor is functioning it uses what are called 'beep codes'.

Originally beep codes were implemented by IBM. However, since then, the major BIOS manufacturers have all developed their own beep codes. The beep codes for particular BIOS may even vary between different versions of the same BIOS's and between different manufacturers of the various BIOS's.

To make matters even more complicated, motherboards may influence the beep codes given by a BIOS.

Most motherboard manufacturers will list the specific beep codes in their product manuals. These codes should be cross referenced to the beep codes published by the various BIOS suppliers.

There are numerous websites that outline the 'Beep Codes' for each type of motherboard.

For example we have shown the Beep Codes for Intel motherboards extracted from one of many websites:

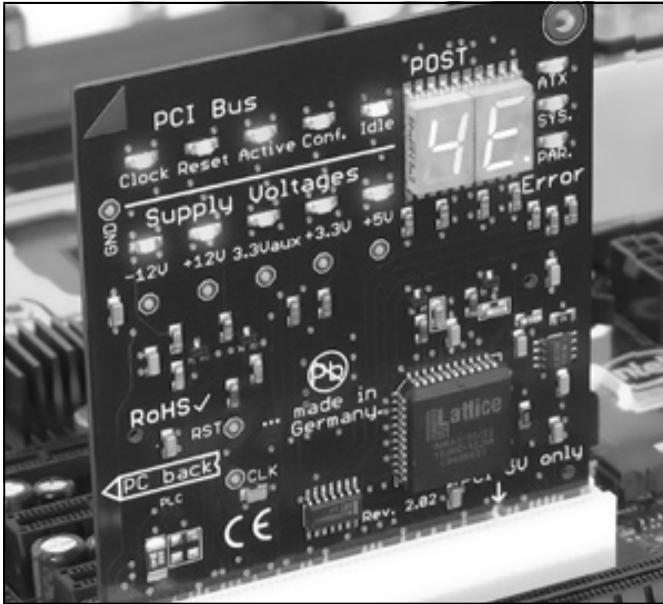


<http://www.postcodemaster.com>

#### Intel Motherboards Beep Codes

- 1 beep Refresh Failure The memory refresh circuitry on the motherboard is faulty.
- 1 continuous beep Memory Failure Memory failure in the first memory block checked.
- 1 long, 2 short No video card found Applies only to motherboards with no on-bd video.
- 1 long, x short Video related failure Other video beep codes may exist and are tied to specific video BIOS implementations. Contact the vendor for details should the need arise.
- 3 short No Monitor connected Applies only to motherboards with on-bd video present.
- 2 beeps Parity Error Parity error in the first 64 KB of memory.
- 3 beeps Base 64 KB Memory Failure Memory failure in the first 64 KB.
- 4 beeps Timer Not Operational Memory failure in the first 64 KB of memory, or Timer 1 on the motherboard is not functioning.
- 5 beeps Processor Error The CPU on the motherboard generated an error.
- 6 beeps 8042 - Gate A20 Failure The keyboard controller may be bad. The BIOS cannot switch to protected mode.
- 7 beeps Processor Exception Interrupt Error The CPU generated an exception interrupt.
- 8 beeps Display Memory Read/Write Error System video adapter is either missing or its memory is faulty. This is not a fatal error.
- 9 beeps ROM Checksum Error ROM checksum value does not match the value encoded in BIOS.
- 10 beeps CMOS Shutdown Reg Rd/Wrt Error The shutdown register for CMOS RAM failed.
- 11 beeps Cache Error / External Cache Bad The external cache is faulty.

Close up



But it is not always possible to rely on the POST to access beep codes. If a computer will not boot it is most likely that the POST will be unable to sound any beep codes at all. In that case a diagnostic hardware device called a POST card, or diagnostic board, is most useful for diagnosing problems. These devices are similar to the motherboard diagnostic cards mentioned earlier.

A POST card functions by detecting the POST codes generated by the operating system and displaying them in some other way other than using the system's monitor or speakers, usually by using LED lights and/or hexadecimal numbers. (Hexadecimal numbers use letters to represent numbers. For example the hexadecimal number for 14 is E.) IT technicians then refer to documentation (which can be quite lengthy) to interpret the meaning of the lights and/or hexadecimal numbers.

POST cards are usually designed to work with particular chip sets and therefore their messages are likely to be misleading when used with other CMOS ROM (i.e. BIOS) chips and motherboards. However some manufactures strive to make their POST cards work on more than one type of slot. For example most PC's which have either an 8 or 16 bit slot can likely be diagnosed with the POST card V3. It is not even necessary to have a monitor or hard disk to troubleshoot a system using this type of diagnostic device.

The general procedures for using a POST card are as follows:

Before you start, make a note of the BIOS version by reading the stamp on the BIOS chip or by using Windows Setup.

- ☆ Disconnect the power to the computer.
- ☆ Install the card in an empty PCI or ISA slot depending on the type of card.
- ☆ Record the post codes shown by the LED lights and/or hexadecimal numbers.
- ☆ Refer to the POST card manual to interpret the POST codes.

SAMPLE SAMPLE

SAMPLE

**Learning  
Activity**

## Research

**LEARNING ACTIVITY ONE**

In this activity you are to find out the type of motherboard your PC has and then locate the POST beep codes by searching on the Internet.

When you have located the codes, print them out and present them to your teacher or trainer for review and discussion.

***TEACHER / TRAINER GUIDANCE NOTES***

This activity will serve two purposes, 1) to get the student or trainee to practice their reaching skills and 2) learn more about the internal hardware of a PC and how the POST beep codes align with their PC motherboard.

SAMPLE SAMPLE

**Learning  
Activity**

## Research

**LEARNING ACTIVITY TWO**

In this Section we touched on 'Hexadecimal numbers'. Do some research and tell us the background of Hexadecimal numbers and then tell us what the Hexadecimal number for 11 is, as well as what it is for 16.

***TEACHER / TRAINER GUIDANCE NOTES***

The Hexadecimal numbers system was developed to describe the binary numbers used in a computer by using numbers and letters.

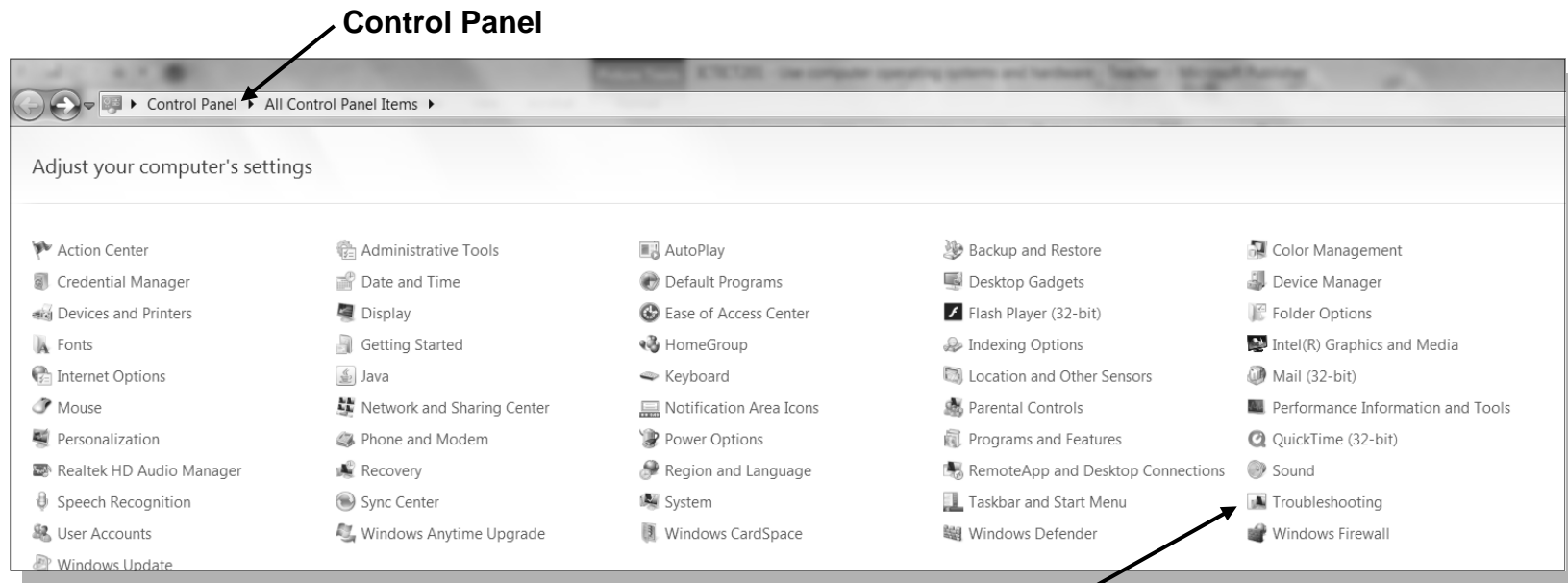
The Hexadecimal number for 11 is B for 16 it is 10.

## WINDOW 7 DIAGNOSTIC TOOLS

Aside from the POST start up features of the motherboard, there are other diagnostic tools that operating systems have in built.

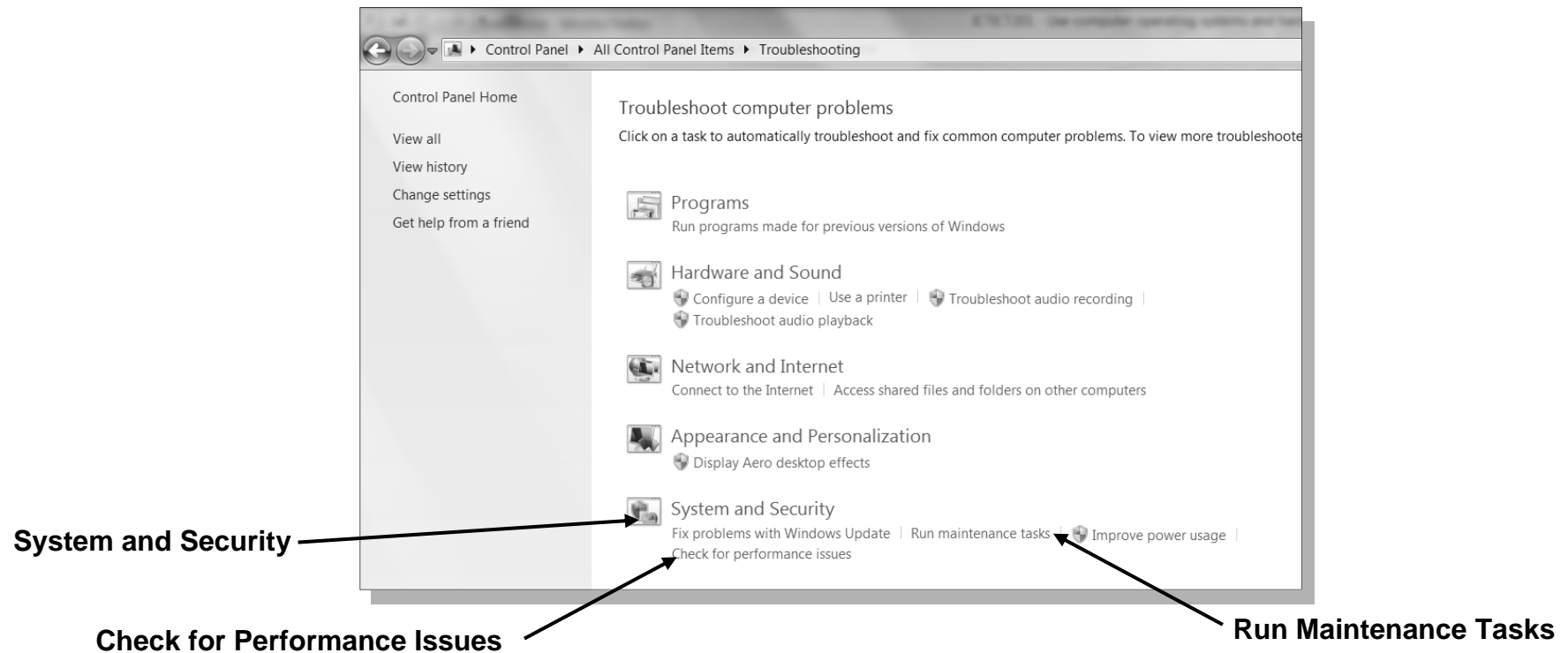
Over the next few pages we look at what Windows 7 has to offer.

The first set of diagnostic tools are found by going to the 'Control Panel' and clicking on 'Troubleshooting'.

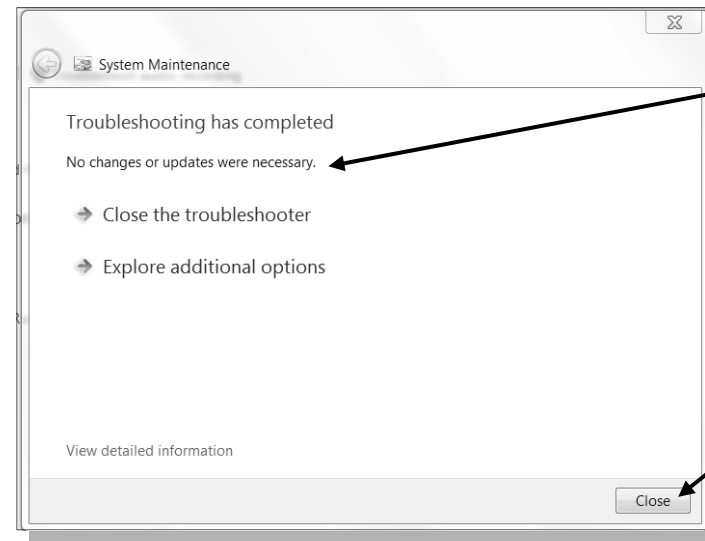
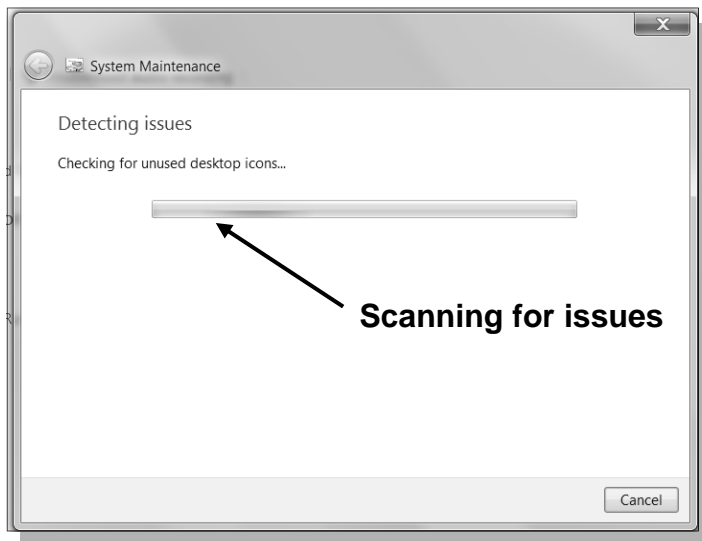
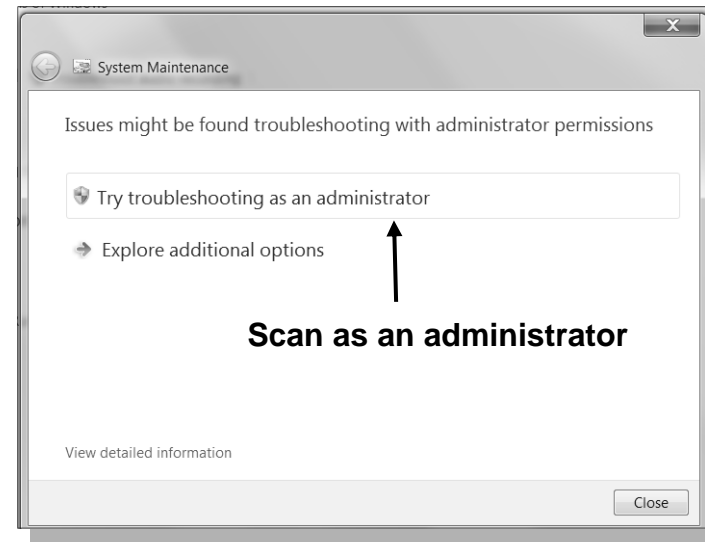
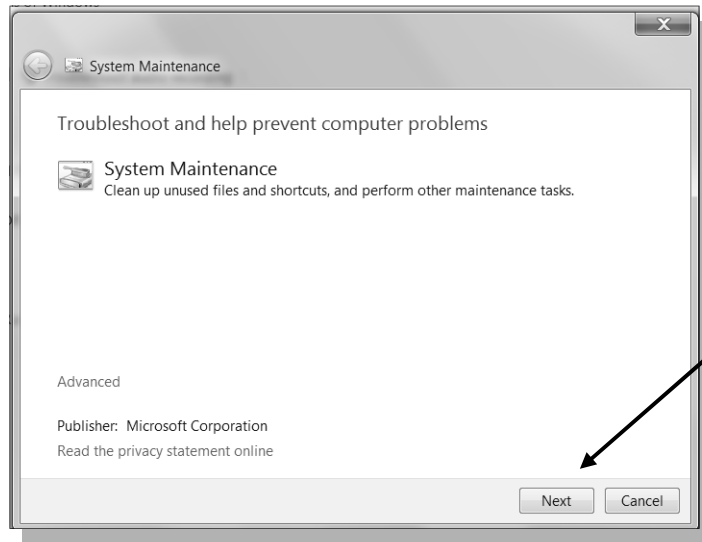


Troubleshooting

You click on 'Troubleshooting' and a new window appears. There are some basic optimising tools under 'System and Security'. The first one is 'Run Maintenance Tasks' and the other is 'Check for Performance Issues'.



If you click on 'Run Maintenance Tasks', a window will appear and you click 'Next'. On the next window you click on the top line 'Try troubleshooting as an administrator'. The next window will appear telling you that the PC is being scanned for issues. The last window will either show a list of issues and tells you what to do to fix them, or simply states that no issues were found.

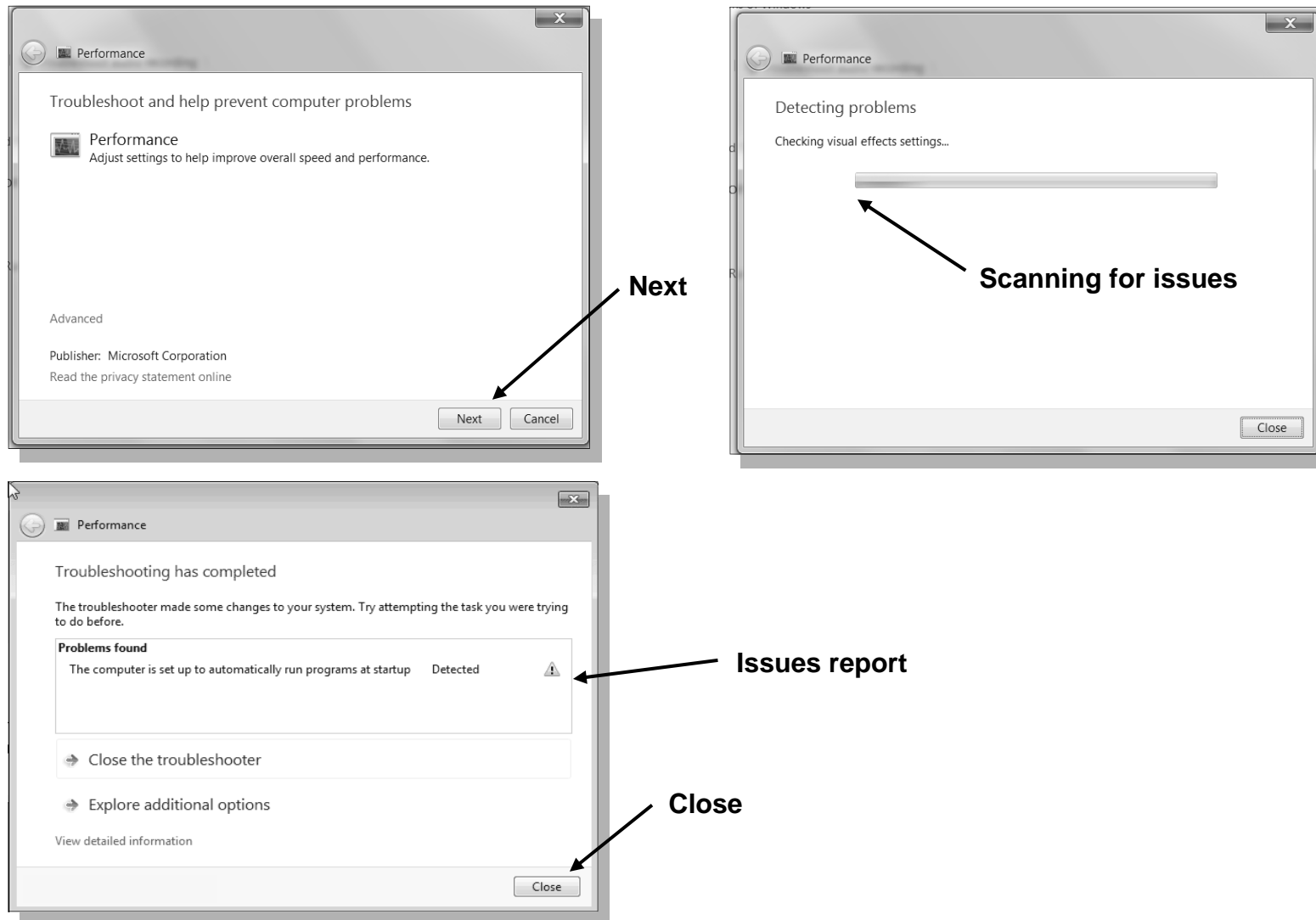


Issues report

Close

SAMPLE SAMPLE

If you click on 'Check for Performance Issues', a window will appear and you click 'Next'. The next window will appear telling you that the PC is being scanned for issues. The last window will either show a list of issues and tells you what to do to fix them, or simply states that no issues were found.



**Learning  
Activity**

## Task

**LEARNING ACTIVITY THREE** (*WINDOWS 7 USERS ONLY*)

In this activity we want you to locate the 'Check for Performance Issues' tool and run this tool on your PC. If this is not your own PC then make sure you have permission to run this tool.

This activity should be done in front of your teacher or trainer. If you are doing this at work or at home, you will need someone to observe you performing this activity. These persons observing you doing this activity will need to have the skills themselves to do this activity so that they can confidently say you have performed this activity successfully.

Your teacher or trainer will likely require some type of evidence that you have performed this activity successfully and your teacher or trainer will let you know as to what form this evidence will need to be.

**TEACHER / TRAINER GUIDANCE NOTES**

This is a practice exercise. It helps to reinforce the knowledge that the student has gained in this section. It is best if the student or trainee was able to do this while the teacher or trainer watches.

If the student or trainee is undertaking this course at a workplace, then the employer or the supervisor could provide evidence that they observed the student or trainee perform this activity successfully.

## DISK MAINTENANCE

There are two other tools that can be used in Windows to optimise the operating system and these two tools relate to the internal hard drive.

The first one is disk cleanup and this is found by going to 'Control Panel' and clicking on 'Performance Information and Tools'. In the next window you click on 'Open disk cleanup'. Another window with a progress bar appears and this is telling you that the disk is being scanned to find areas where cleanup should take place. After this has been done a new window appears and this gives you a list of what you may want to be cleaned up on the hard drive. You tick the options and then click 'OK' and a new window appears to tell you that the disk is being cleaned.

**Control Panel**

**Performance Information and Tools**

**Scanning disk**

**Open disk cleanup**

**Cleaning options**

**Disk cleaning progress**

**OK**

Component	What is rated
<b>Processor:</b>	Calculations per second
<b>Memory (RAM):</b>	Memory operations per second
<b>Graphics:</b>	Desktop performance for Windows Aero
<b>Gaming graphics:</b>	3D business and gaming graphics performance
<b>Primary hard disk:</b>	Disk data transfer rate

Files to delete:	Size
<input type="checkbox"/> Downloaded Program Files	0 bytes
<input checked="" type="checkbox"/> Temporary Internet Files	834 KB
<input checked="" type="checkbox"/> Offline webpages	38.6 KB
<input type="checkbox"/> Game News Files	1.82 KB
<input type="checkbox"/> Game Statistics Files	2.62 KB

Total amount of disk space you gain: 3.81 MB

Description: Downloaded Program Files are ActiveX controls and Java applets downloaded automatically from the Internet when you view certain pages. They are temporarily stored in the Downloaded Program Files folder on your hard disk.

How does Disk Cleanup work?

**Learning  
Activity**

## Task

**LEARNING ACTIVITY FOUR** (*WINDOWS 7 USERS ONLY*)

In this activity we want you to locate the 'Open cleanup' tool and run this tool on your PC. If this is not your own PC then make sure you have permission to run this tool.

This activity should be done in front of your teacher or trainer. If you are doing this at work or at home, you will need someone to observe you performing this activity. These persons observing you doing this activity will need to have the skills themselves to do this activity so that they can confidently say you have performed this activity successfully.

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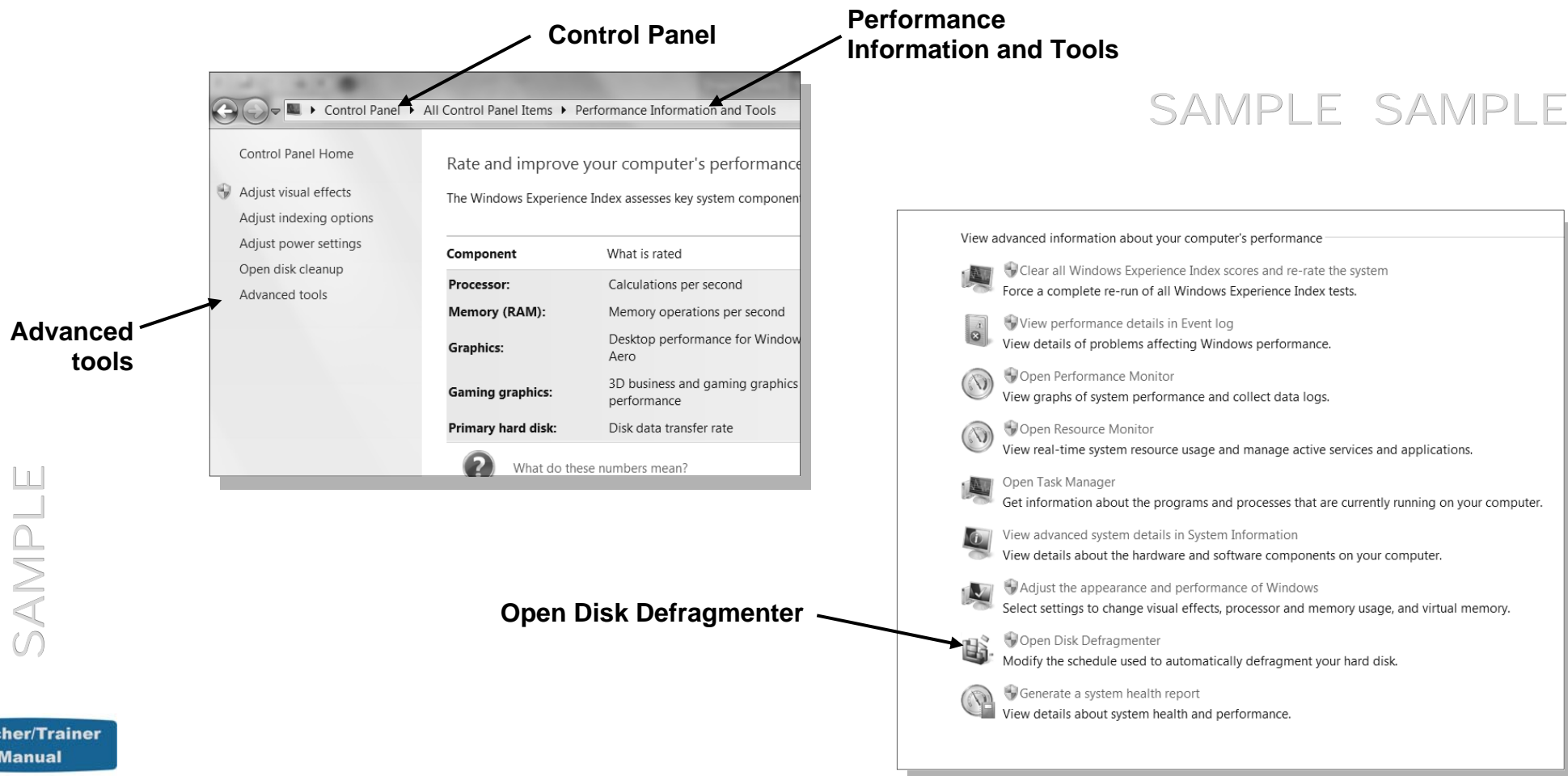
***TEACHER / TRAINER GUIDANCE NOTES***

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## DISK DEFRAGMENTATION

When you delete files and uninstall programs your hard disk will start developing gaps. These gaps get filled in by new programs and this process is referred to as 'File fragmentation'. This can cause your computer to run slower, as the PC needs to look harder at various parts of the hard drive to find what it needs. The 'Disk Defragmenter' takes all these parts and puts them together as well as grouping frequently used files together. To defragment your drive/s, go to 'Control Panel' and click on 'Performance Information and Tools'. In the next window you click on 'Advanced tools'. On the next window you click on 'Open Disk Defragmenter'.



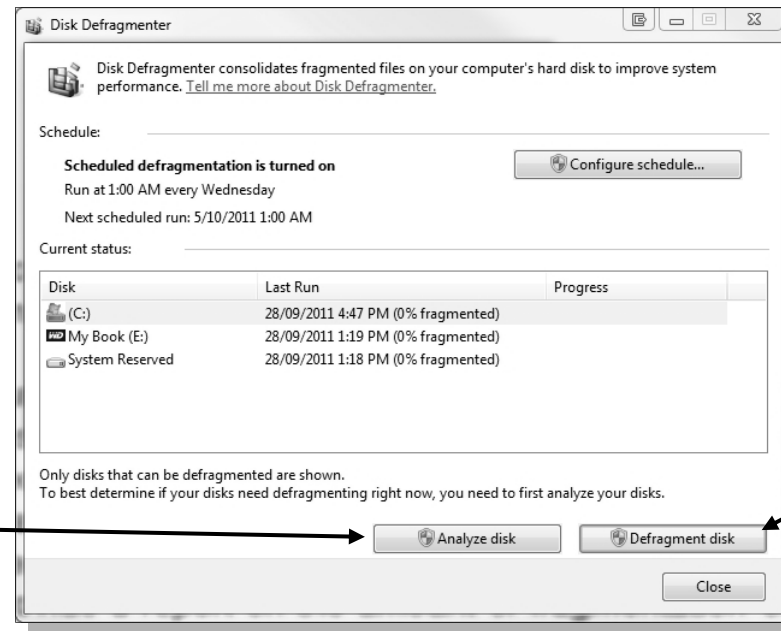
In the next window a report is shown on the amount of fragmentation on the disks.

It is first suggested that you 'Analyse Disk'. If it does not a window will appear suggesting defragmenting is not required. Defragmenting a disk can take quite awhile and it is suggested that you do not use the PC until the defragmenting is completed. To defragment the disks select the disk and click 'Defragment disk'.

Defragmentation report

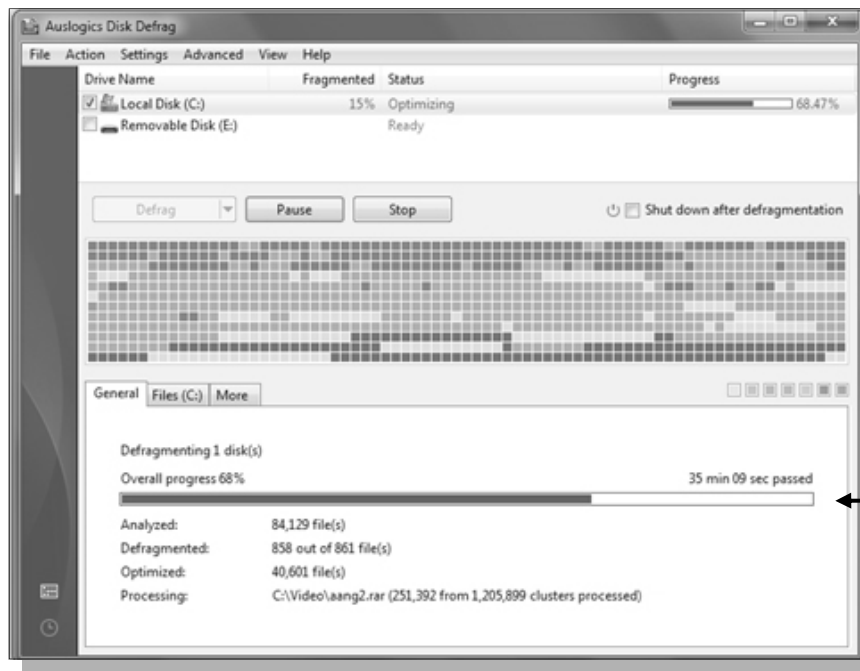
Analyse disk

Defragment disk



The defragment window will appear and the defragmenting process begins. A progress bar shows how far into the process the PC is in.

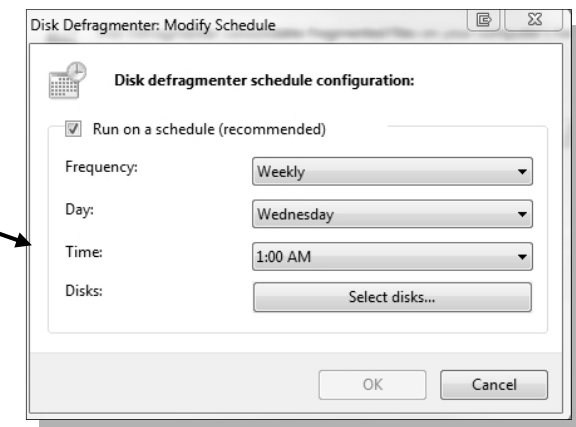
You can also set up an automatic schedule by selecting 'Configure schedule' and entering the frequency you would like the process run. This is suggested because the process can be done when the computer is likely not being used.



Defragmentation process

Defragmentation progress

Defragmentation schedule



**Learning  
Activity**

## Task

**LEARNING ACTIVITY FIVE** (*WINDOWS 7 USERS ONLY*)

In this activity we want you to locate the 'Disk defragmentation' tool and run this tool on your PC. If this is not your own PC then make sure you have permission to run this tool. This task can take some time to do so allocate enough time to do so.

This activity should be done in front of your teacher or trainer. If you are doing this at work or at home, you will need someone to observe you performing this activity. These persons observing you doing this activity will need to have the skills themselves to do this activity so that they can confidently say you have performed this activity successfully.

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**TEACHER / TRAINER GUIDANCE NOTES**

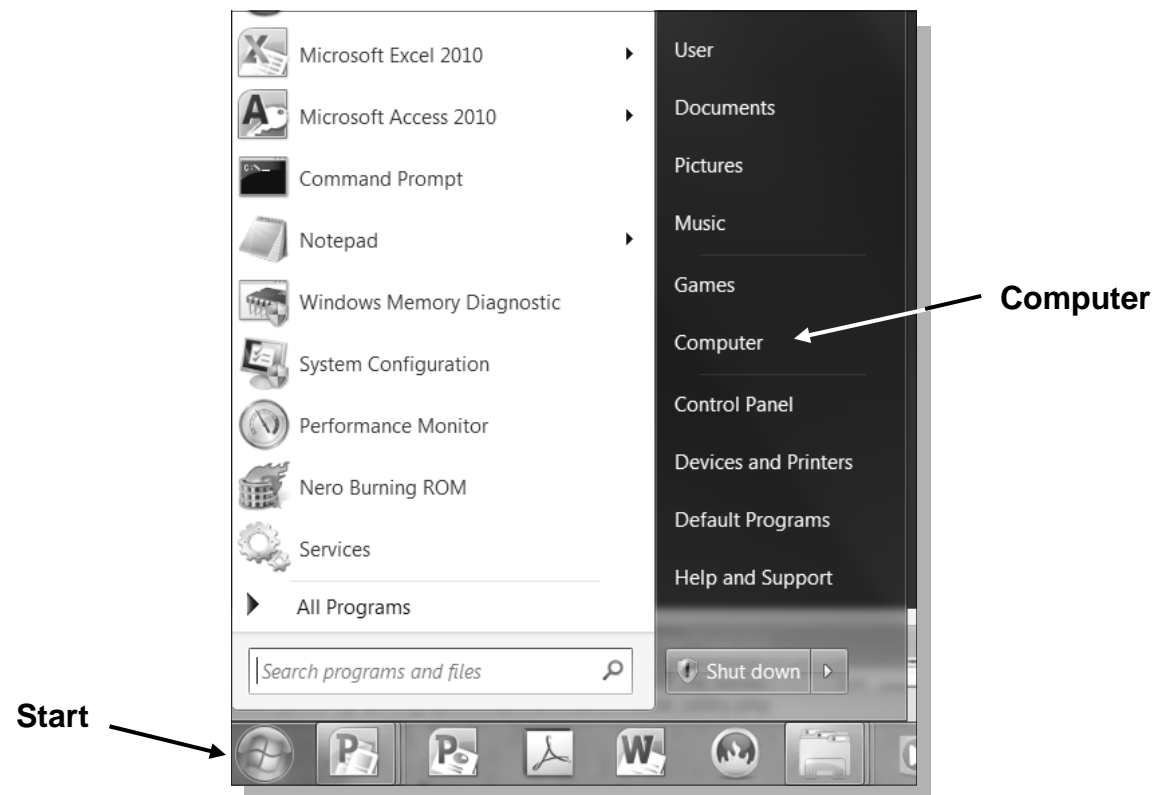
This is a practice exercise. It helps to reinforce the knowledge that the student has gained in this section. It is best if the student or trainee was able to do this while the teacher or trainer watches.

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## CHKDSK UTILITY IN WINDOWS 7

For more comprehensive hard disk checking you would use the CHKDSK utility. (CHKDSK stands for Check Disk). This should be done when the computer is not being used.

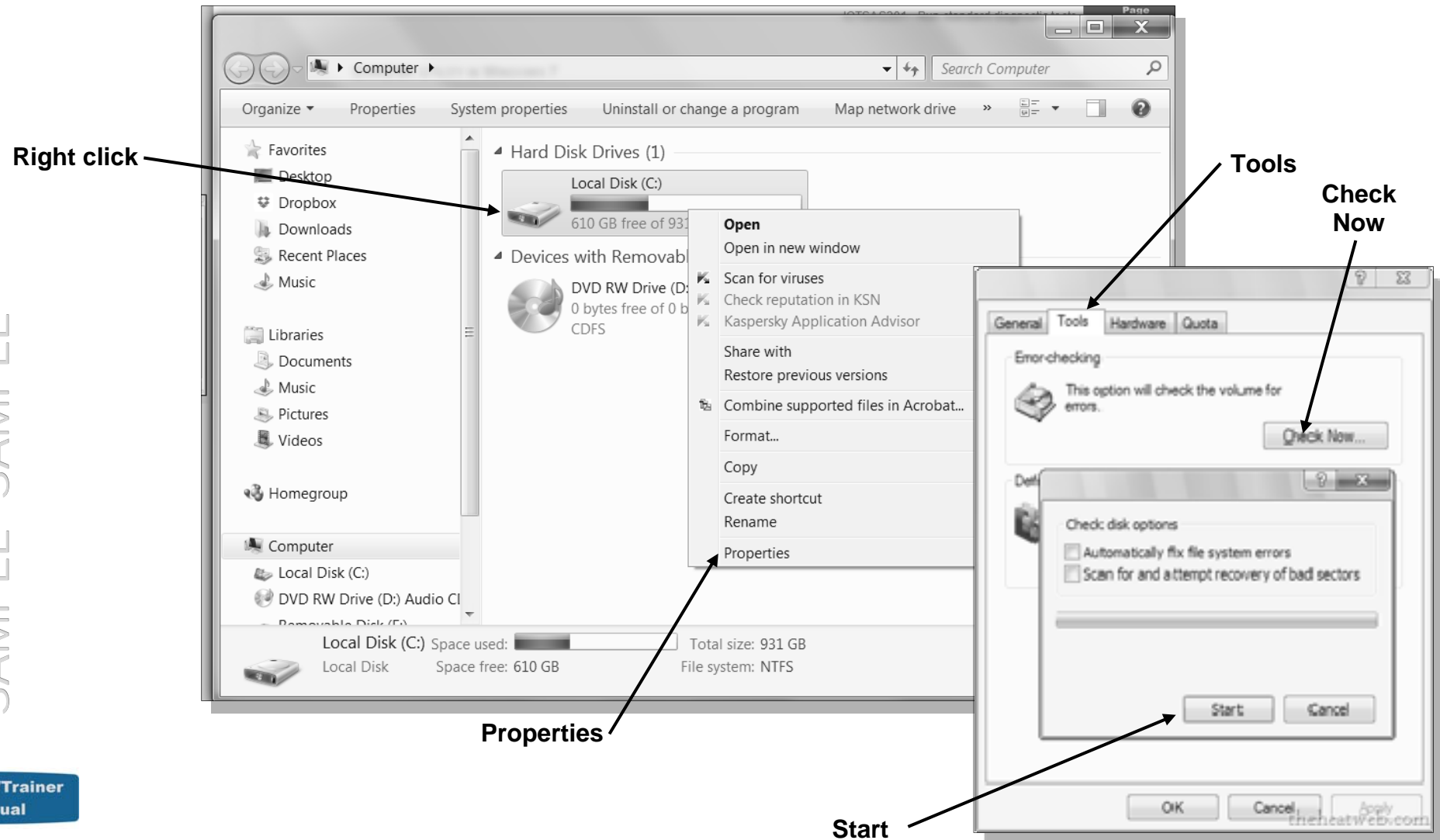
To run CHKDSK in Windows 7 you go to the 'Start Menu' and click on 'Computer'.



In the next window you locate the disk you want to check and right click on the disk picture.

On the next window you click on 'Properties'. In the next window you click on 'Tools', then 'Check Now' under 'Error Checking' and when the next window appears, you click on 'Start'.

SAMPLE SAMPLE



On your screen you will see the CHKDSK tool start. Once it has been completed and if there are no errors, then the operating system will let you know. If there are any errors the CHKSK utility will ask you if you want the errors repaired

```
Administrator: C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Windows\system32>chkdsk h:
The type of the file system is NTFS.
Volume label is Shanao (???).

WARNING! F parameter not specified.
Running CHKDSK in read-only mode.

CHKDSK is verifying files (stage 1 of 3)...
91136 file records processed.
File verification completed.
91 large file records processed.
0 bad file records processed.
0 EA records processed.
0 reparse records processed.
CHKDSK is verifying indexes (stage 2 of 3)...
100700 index entries processed.
Index verification completed.
0 unindexed files scanned.
0 unindexed files recovered.
CHKDSK is verifying security descriptors (stage 3 of 3)...
91136 file SDs/SIDs processed.
Security descriptor verification completed.
4783 data files processed.
CHKDSK is verifying Usn Journal...
34390232 USN bytes processed.
Usn Journal verification completed.
Windows has checked the file system and found no problems.

976629759 KB total disk space.
615066560 KB in 76944 files.
29768 KB in 4784 indexes.
0 KB in bad sectors.
220527 KB in use by the system.
65536 KB occupied by the log file.
361312904 KB available on disk.

4096 bytes in each allocation unit.
244157439 total allocation units on disk.
90328226 allocation units available on disk.

C:\Windows\system32>
```

CHKDSK utility

Error free window



```
\cache
Removing trailing folder entries from \Android\data\com.sec.android.gallery3d\ca
che
Removing trailing folder entries from \media
\my_sounds\Theme5.wav is cross-linked on allocation unit 839.
Cross link resolved by copying.
\my_sounds\TARDIS text alert.mp3 is cross-linked on allocation unit 3137.
Cross link resolved by copying.
Removing trailing folder entries from \my_sounds
File and folder verification is complete.
Convert lost chains to files (Y/N)?
```

Confirm repairs

**Learning  
Activity**

## Task

**LEARNING ACTIVITY SIX** (*WINDOWS 7 USERS ONLY*)

In this activity we want you to locate the 'CHKDSK utility' tool and run this tool on your PC. If this is not your own PC then make sure you have permission to run this tool.

This activity should be done in front of your teacher or trainer. If you are doing this at work or at home, you will need someone to observe you performing this activity. These persons observing you doing this activity will need to have the skills themselves to do this activity so that they can confidently say you have performed this activity successfully.

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***TEACHER / TRAINER GUIDANCE NOTES***

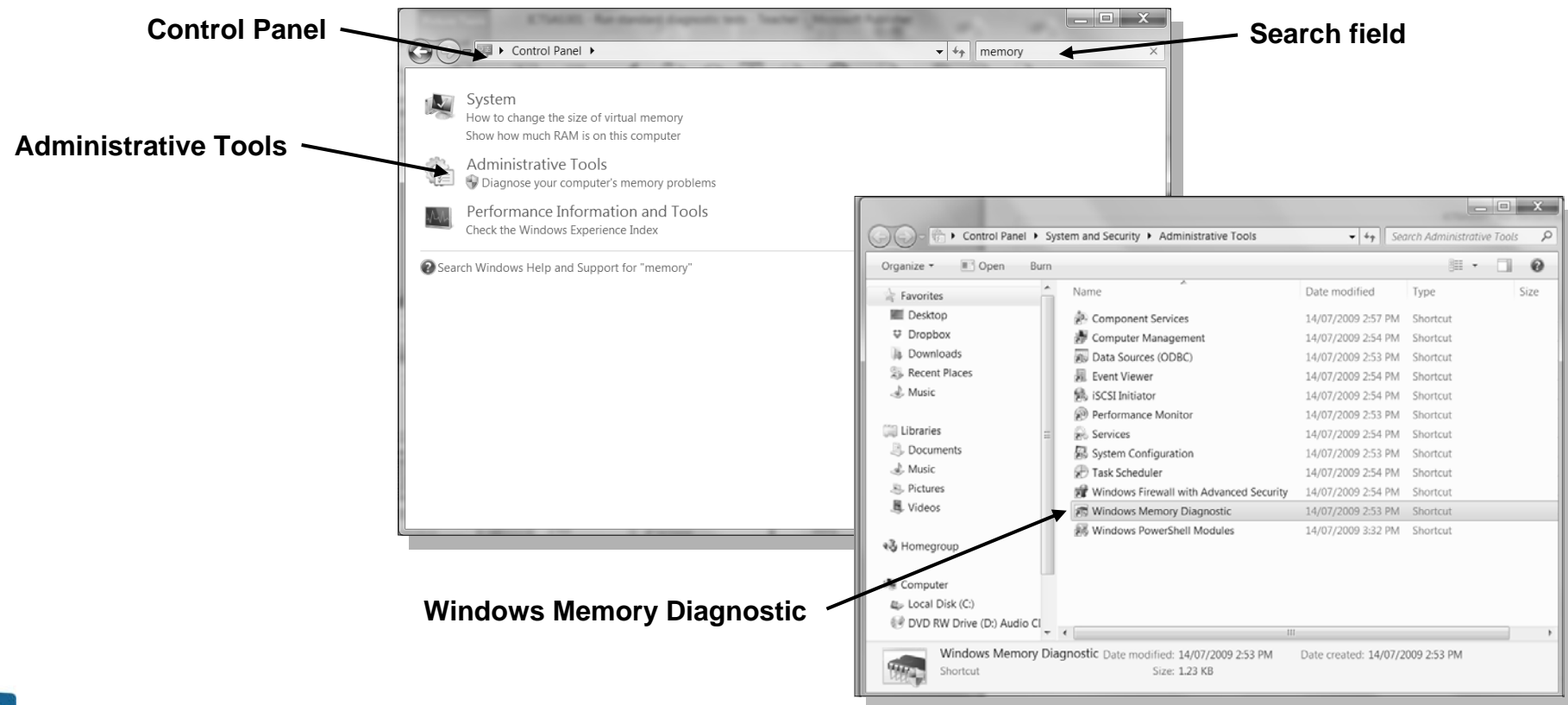
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## WINDOWS 7 MEMORY TEST

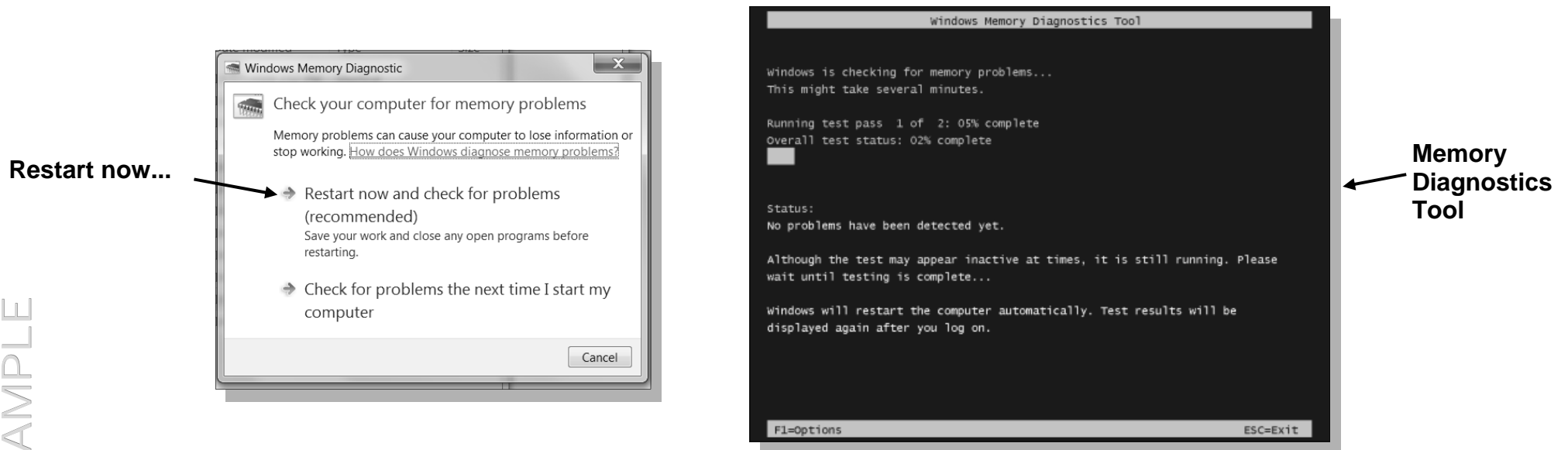
Windows 7 includes built-in features to help you identify and diagnose problems with memory. If you suspect a computer has a memory problem that isn't being automatically detected, you can run the Windows Memory Diagnostics utility.

To do this click on 'Control Panel' and then in the search field type in 'Memory'. In the new window you click on 'Administrative Tools' and Then on the next window you click on 'Windows Memory Diagnostic'.

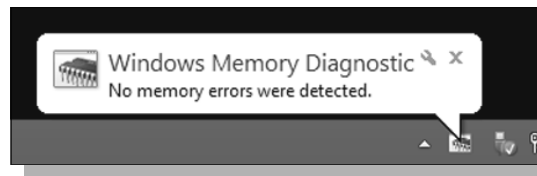


A window will appear to start the memory diagnostic check. It is important that all programs and applications are closed and you need to be aware that this test can take some time.

If you choose to restart your computer and run the tool immediately, make sure that you save your work and close all of your running programs. The Memory Diagnostics Tool will run automatically when you click on 'Restart now...'.



It might take several minutes for the tool to finish checking your computer's memory. Once the test is completed, Windows will restart automatically and if there are no errors, it will let you know.





However, if the tool detects errors, memory errors usually indicate a problem with the memory chips in your computer or other hardware problem. In some cases, the memory modules (RAM chips) might simply not be correctly installed in the motherboard memory socket, which would cause memory errors, even though the modules are not faulty.

Other times you may need to manually take other steps to identify a failing memory component. To do that you would need to open the computer's case and work with the internal hardware. Doing this incorrectly can result in damage to your hardware.

Therefore you should not attempt this if you:

- ☆ have no experience working with computer hardware,
- ☆ are unwilling to take the chance of damaging your hardware, or if you
- ☆ have a computer that is still under warranty.

If you do decide to work with your hardware, you should remind yourself of the following recommendations and guidelines before starting:

- ☆ Turn off the computer, and disconnect the power cord from the wall socket.
- ☆ Touch an unpainted metal part of your computer case with your hand to help discharge any static electricity from your body.
- ☆ Do not walk around while working on a computer (walking can produce static electrical build-up). If you do need to walk around after grounding yourself, you should re-ground yourself before working on the computer again.
- ☆ And, ideally, wear an antistatic wrist strap as described earlier.

Use procedures similar to the following to identify the faulty RAM chip. Remove all memory modules except for one. Rerun Windows Memory Diagnostic and then do one of the following:

- ☆ If no errors are reported, remove the current memory module and add one from the set of memory modules that you previously removed.
- ☆ If errors are reported, remove the current memory module, making sure to separate it from the other memory modules.
- ☆ Add a new memory module from the set of memory modules that have not yet been tested.
- ☆ Rerun Windows Memory Diagnostic.
- ☆ Repeat this procedure until all the memory modules have been tested.

**Learning  
Activity**

## Task

**LEARNING ACTIVITY SEVEN** (*WINDOWS 7 USERS ONLY*)

In this activity we want you to locate the 'Memory testing' tool and run this tool on your PC. If this is not your own PC then make sure you have permission to run this tool. This tool can take awhile to complete so ensure you have allocated enough time to do so.

This activity should be done in front of your teacher or trainer. If you are doing this at work or at home, you will need someone to observe you performing this activity. These persons observing you doing this activity will need to have the skills themselves to do this activity so that they can confidently say you have performed this activity successfully.

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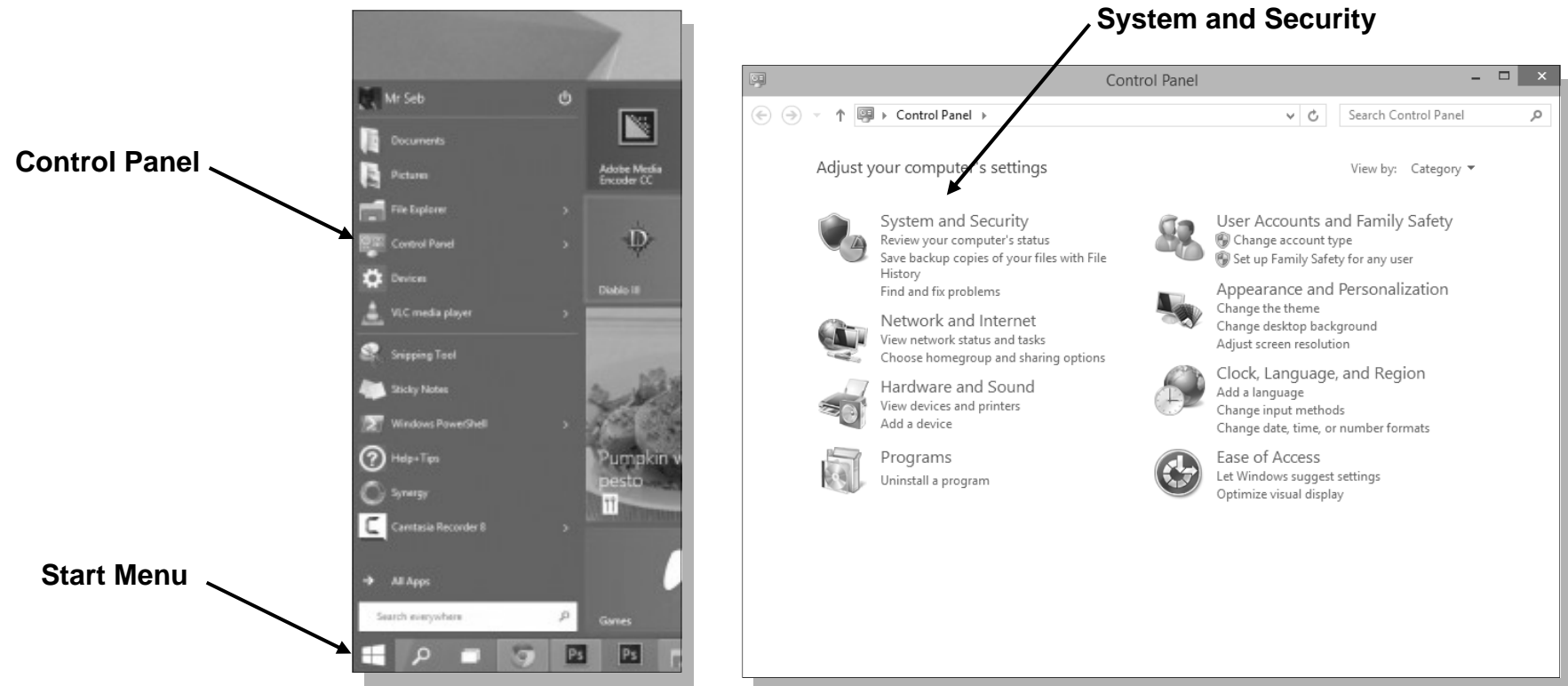
**TEACHER / TRAINER GUIDANCE NOTES**

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## WINDOW 10 DIAGNOSTIC TOOLS

To locate do basic diagnostic tasks in Windows 10 you go to the 'Control Panel' and click on 'System and Security'.

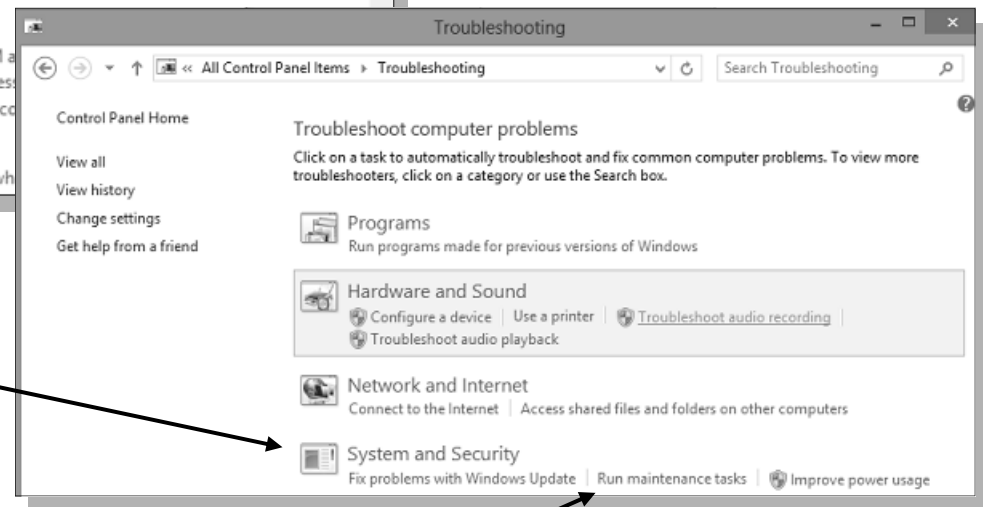
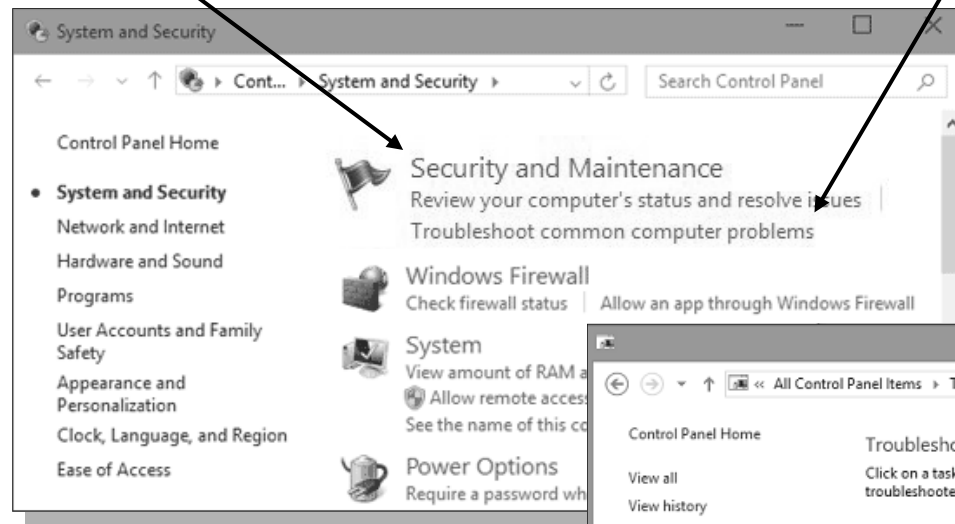


In the next window you click on 'Troubleshoot common computer problems' under 'Security and Maintenance'.

In the next window you click on 'Run maintenance tasks' under 'Systems and Security'.

**Security and Maintenance**

**Troubleshoot common  
computer problems**

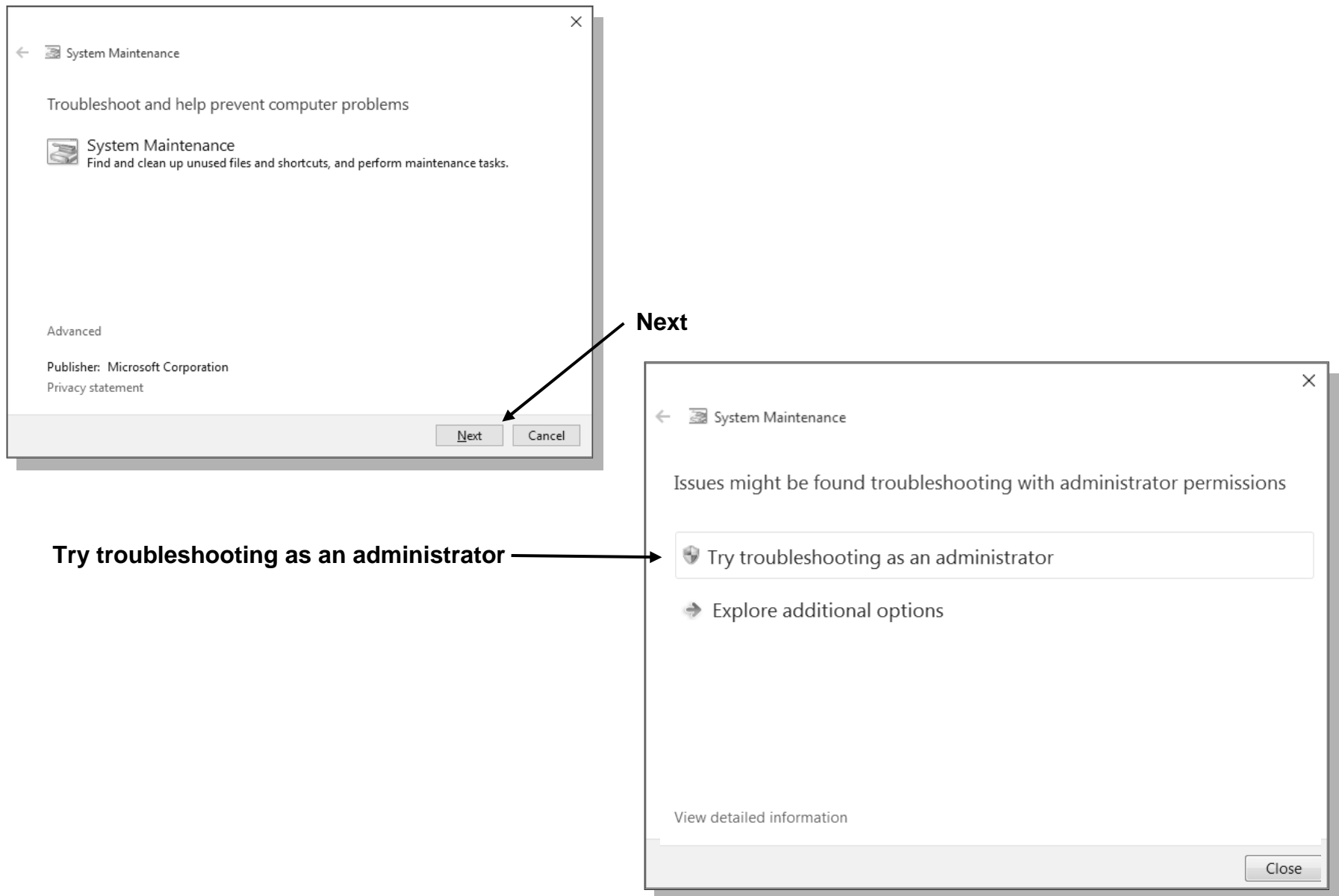


**System and Security**

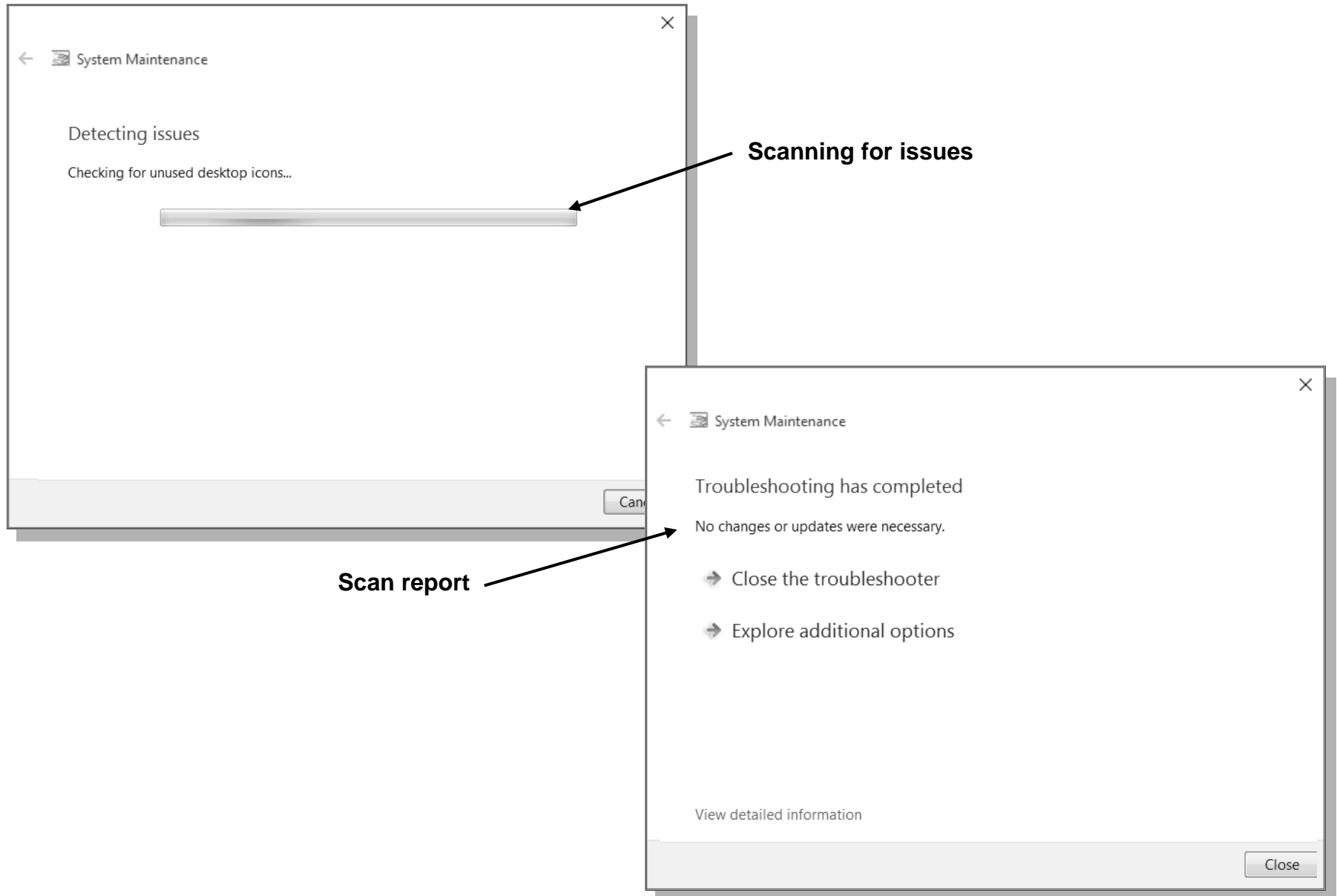
**Run maintenance tasks**

SAMPLE SAMPLE

A new window appears and this is the start of the maintenance task process. In this window you would click 'Next' to start the process. In the next window to appear you double click on 'Try troubleshooting as an administrator'.



A new window appears and this is the start of the maintenance task process. You simply wait until the scanning is completed and the next window to appear will report on any issues. If there are issues then suggestions will be here as to how to fix them.



SAMPLE SAMPLE

**Learning  
Activity**

## Task

**LEARNING ACTIVITY EIGHT** *(WINDOWS 10 USERS ONLY)*

In this activity we want you to locate the 'Run Maintenance Tasks' tool and run this tool on your PC.

This activity should be done in front of your teacher or trainer. If you are doing this at work or at home, you will need someone to observe you performing this activity. These persons observing you doing this activity will need to have the skills themselves to do this activity so that they can confidently say you have performed this activity successfully.

Your teacher or trainer will likely require some type of evidence that you have performed this activity successfully and your teacher or trainer will let you know as to what form this evidence will need to be.

**TEACHER / TRAINER GUIDANCE NOTES**

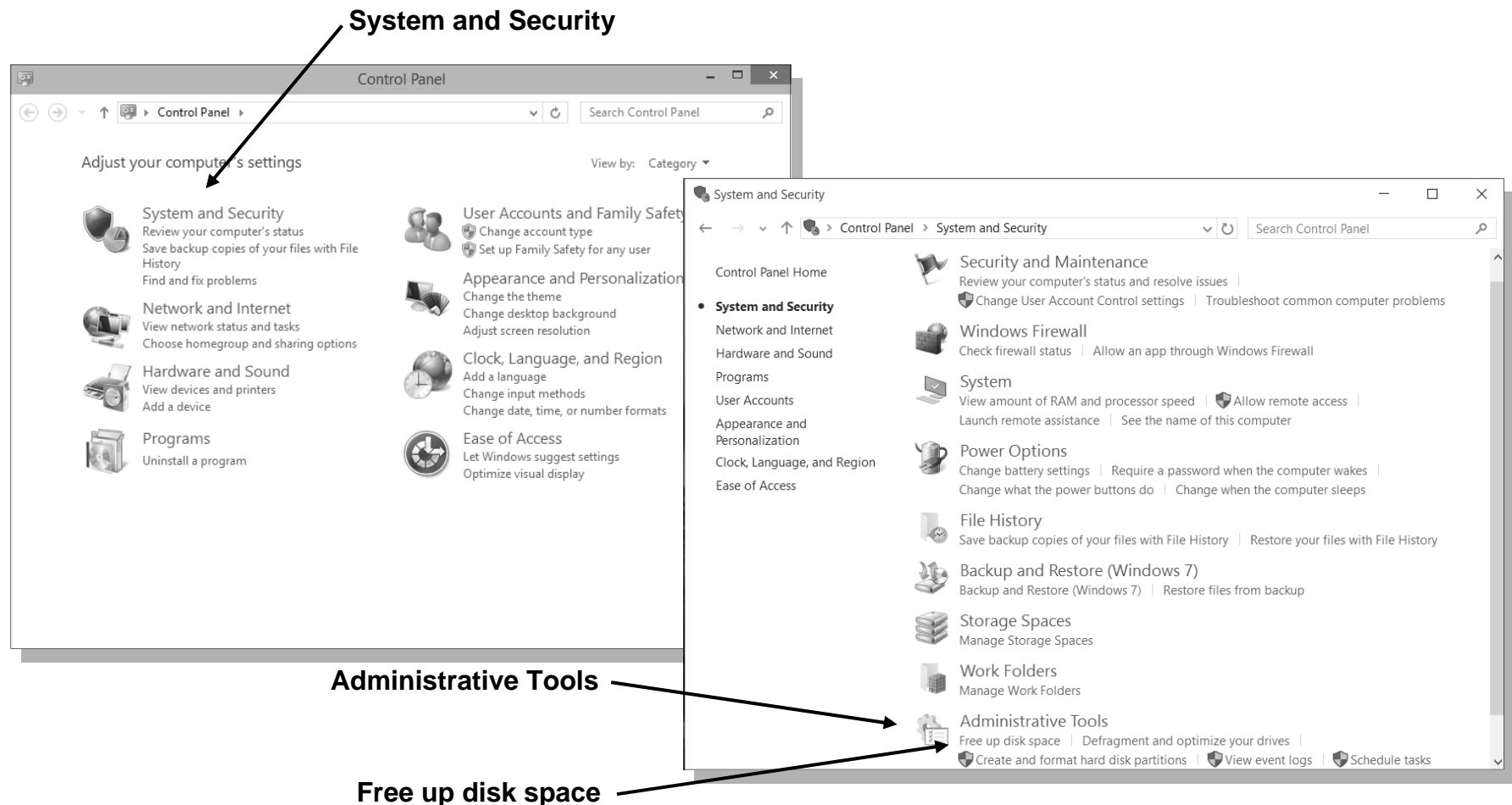
This is a practice exercise. It helps to reinforce the knowledge that the student has gained in this section. It is best if the student or trainee was able to do this while the teacher or trainer watches.

If the student or trainee is undertaking this course at a workplace, then the employer or the supervisor could provide evidence that they observed the student or trainee perform this activity successfully.

## DISK MAINTENANCE

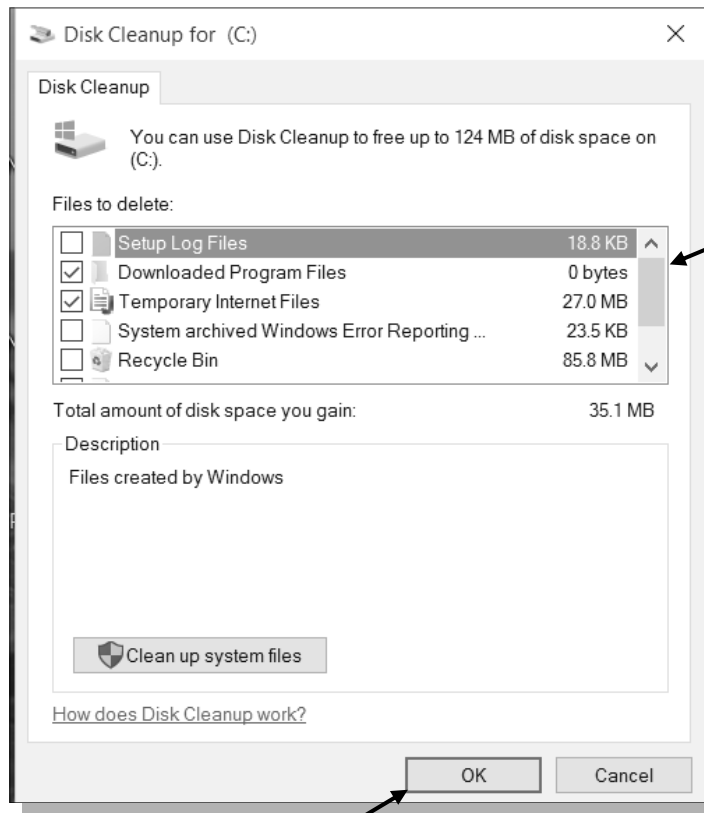
There are two other tools that can be used in Windows to optimise the operating system and these two tools relate to the internal hard drive.

The first one is disk cleanup and this is found by going to 'Control Panel' and clicking on 'System and Security'. In the next window you click on 'Free up disk space' under 'Administrative Tools'.

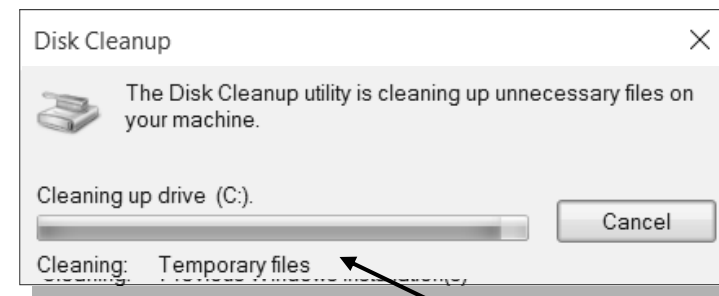


SAMPLE SAMPLE

After this has been done a new window appears and this gives you a list of what you may want to be cleaned up on the hard drive. You tick the options and then click 'OK' and a new window appears to tell you that the disk is being cleaned.



Cleanup options



Cleanup progress

OK

**Learning  
Activity**

## Task

**LEARNING ACTIVITY NINE** *(WINDOWS 10 USERS ONLY)*

In this activity we want you to locate the 'Disk cleanup' tool and run this tool on your PC. If this is not your own PC then make sure you have permission to run this tool.

This activity should be done in front of your teacher or trainer. If you are doing this at work or at home, you will need someone to observe you performing this activity. These persons observing you doing this activity will need to have the skills themselves to do this activity so that they can confidently say you have performed this activity successfully.

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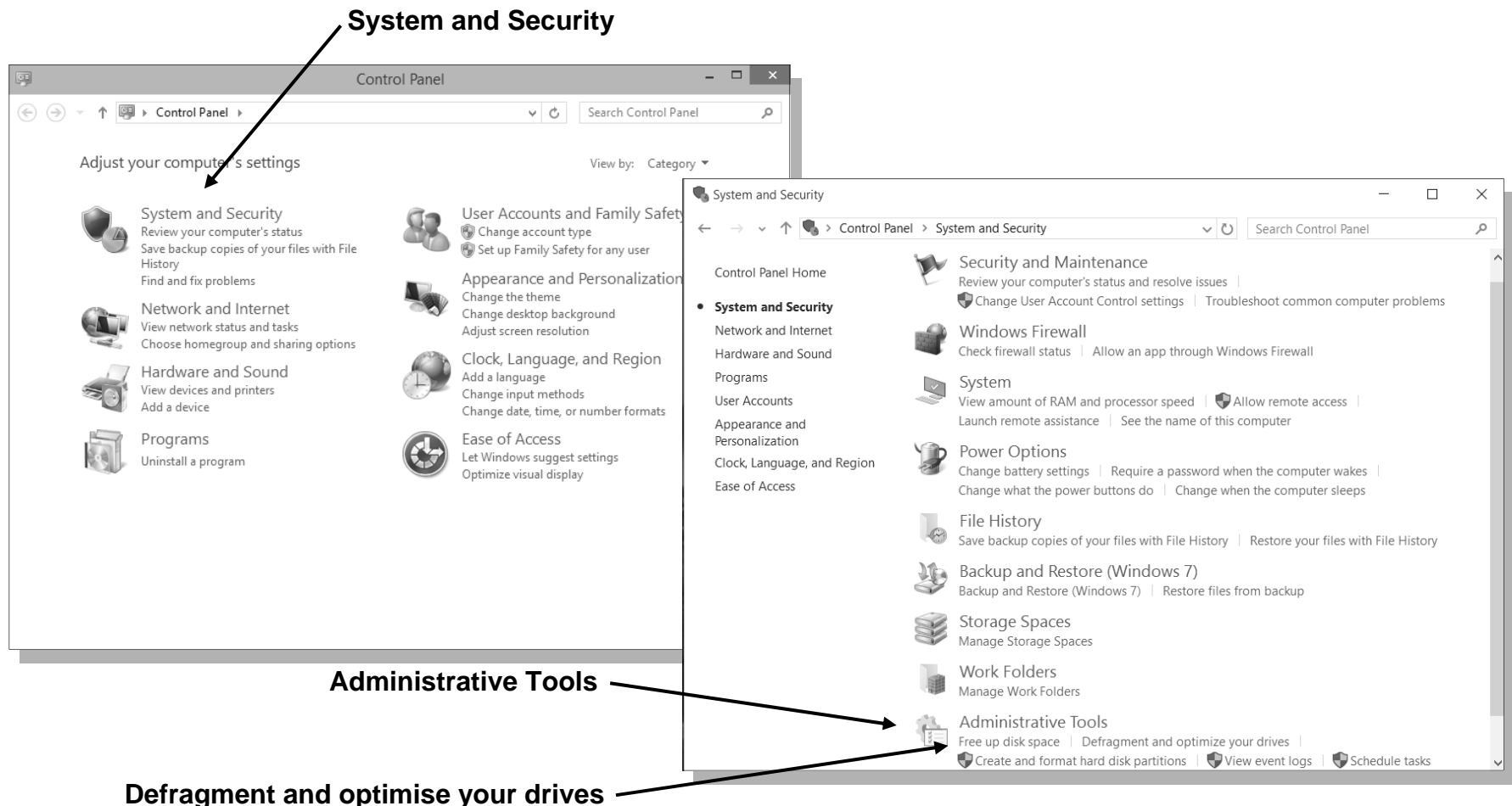
***TEACHER / TRAINER GUIDANCE NOTES***

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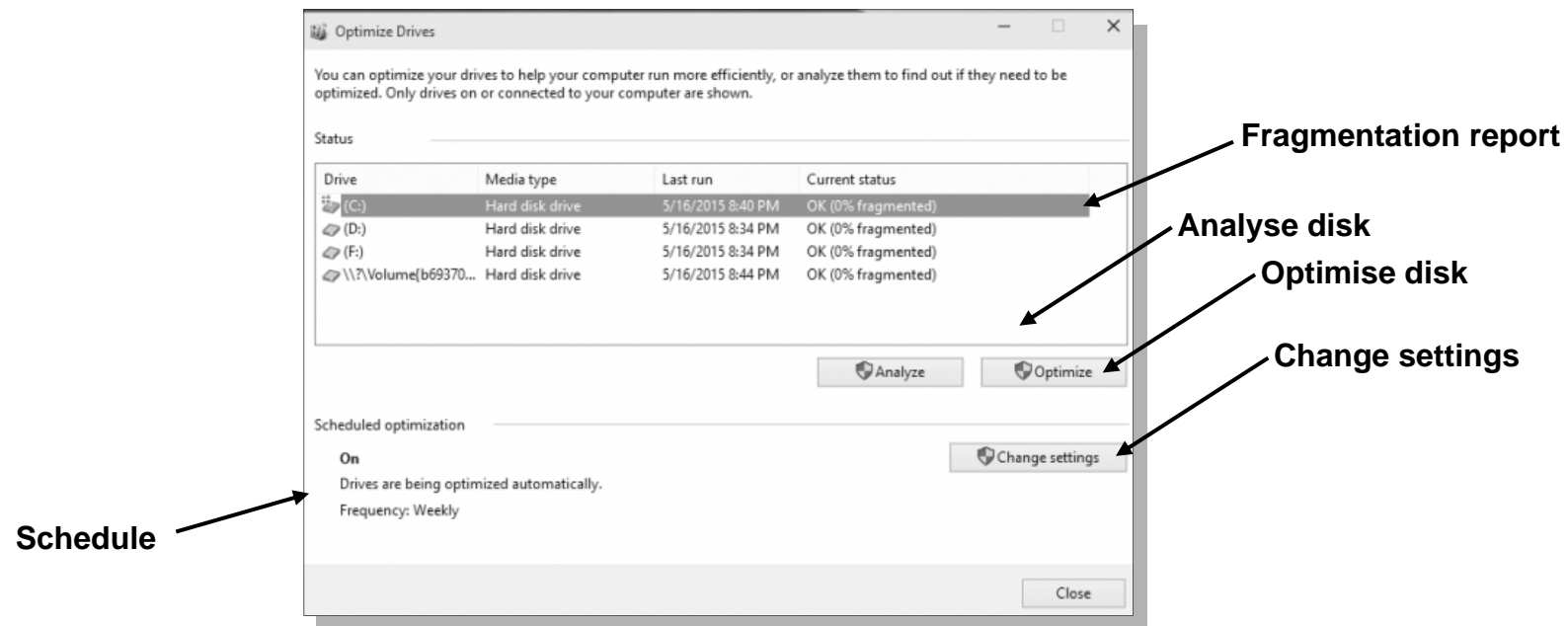
## DISK DEFRAGMENTATION

When you delete files and uninstall programs your hard disk will start developing gaps. These gaps get filled in by new programs and this process is referred to as 'File fragmentation'. This can cause your computer to run slower, as the PC needs to look harder at various parts of the hard drive to find what it needs. The 'Disk Defragmenter' takes all these parts and puts them together as well as grouping frequently used files together. To defragment your drive/s, go to 'Control Panel' and click on 'System and Security'. In the next window you click on 'Defragment and optimise your drives' under 'Administrative Tools'.



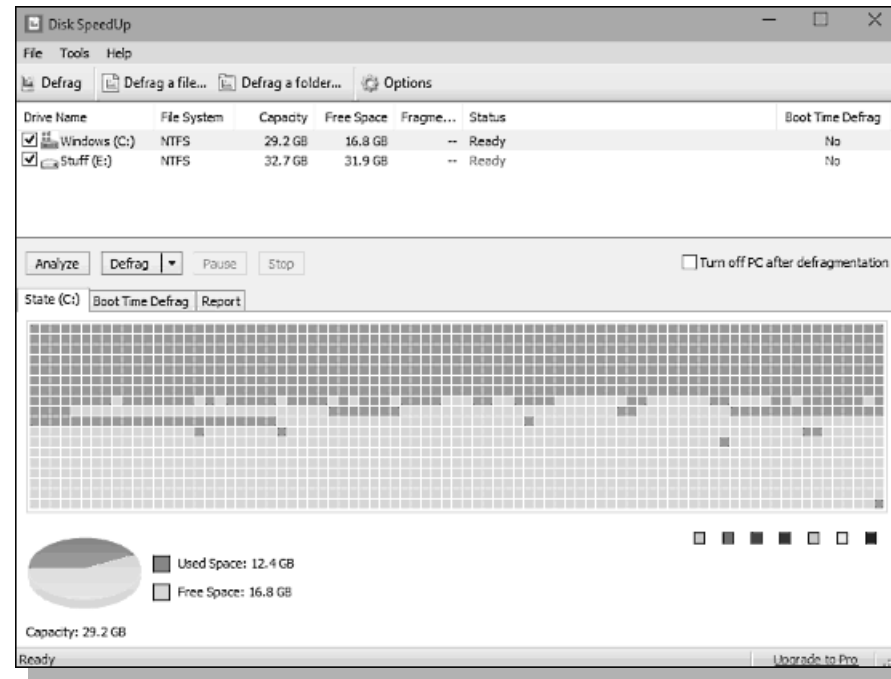
In the next window a report is shown on the amount of fragmentation on the disks. In the example below the disks are OK.

However, it is suggested that you 'Analyse Disk'. If it does not a window will appear suggesting defragmenting is not required. Defragmenting a disk can take quite awhile and it is suggested that you do not use the PC until the defragmenting is completed. To defragment the disks select the disk and click 'Optimise'.



You can also schedule automatic defragmentation or optimisation. This is handy to do when you know the computer is not being used. To do this you click on 'Change settings' and choose the time and frequency you wish to have the PC automatically defragmented or optimised.

The defragment window will appear and the defragmenting process begins. You will need to wait until the process is completed. Depending on the extent of fragmentation, this could take several hours.



**Learning  
Activity**

## Task

**LEARNING ACTIVITY TEN** (*WINDOWS 10 USERS ONLY*)

In this activity we want you to locate the 'Disk defragmentation' tool and run this tool on your PC. If this is not your own PC then make sure you have permission to run this tool. This task can take some time to do so allocate enough time to do so.

This activity should be done in front of your teacher or trainer. If you are doing this at work or at home, you will need someone to observe you performing this activity. These persons observing you doing this activity will need to have the skills themselves to do this activity so that they can confidently say you have performed this activity successfully.

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**TEACHER / TRAINER GUIDANCE NOTES**

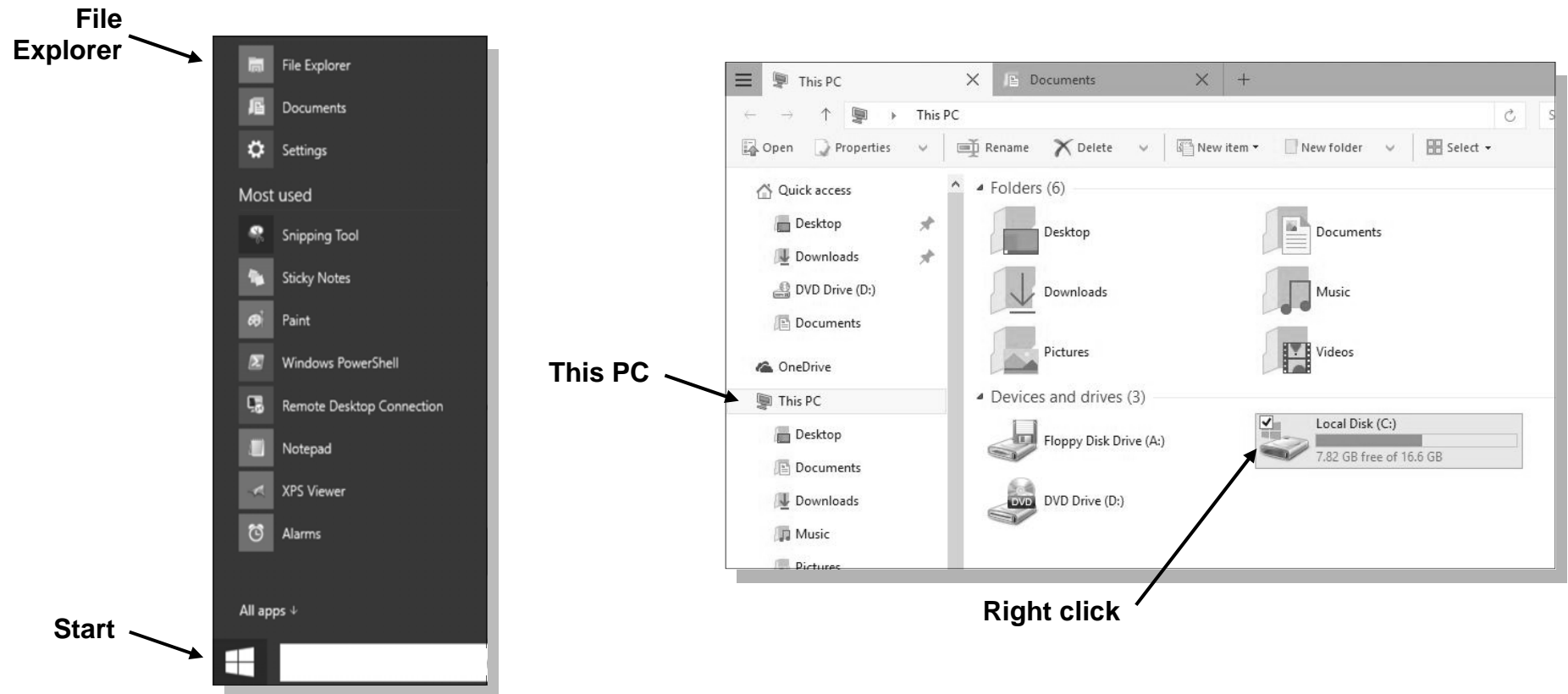
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## CHKDSK UTILITY IN WINDOWS 10

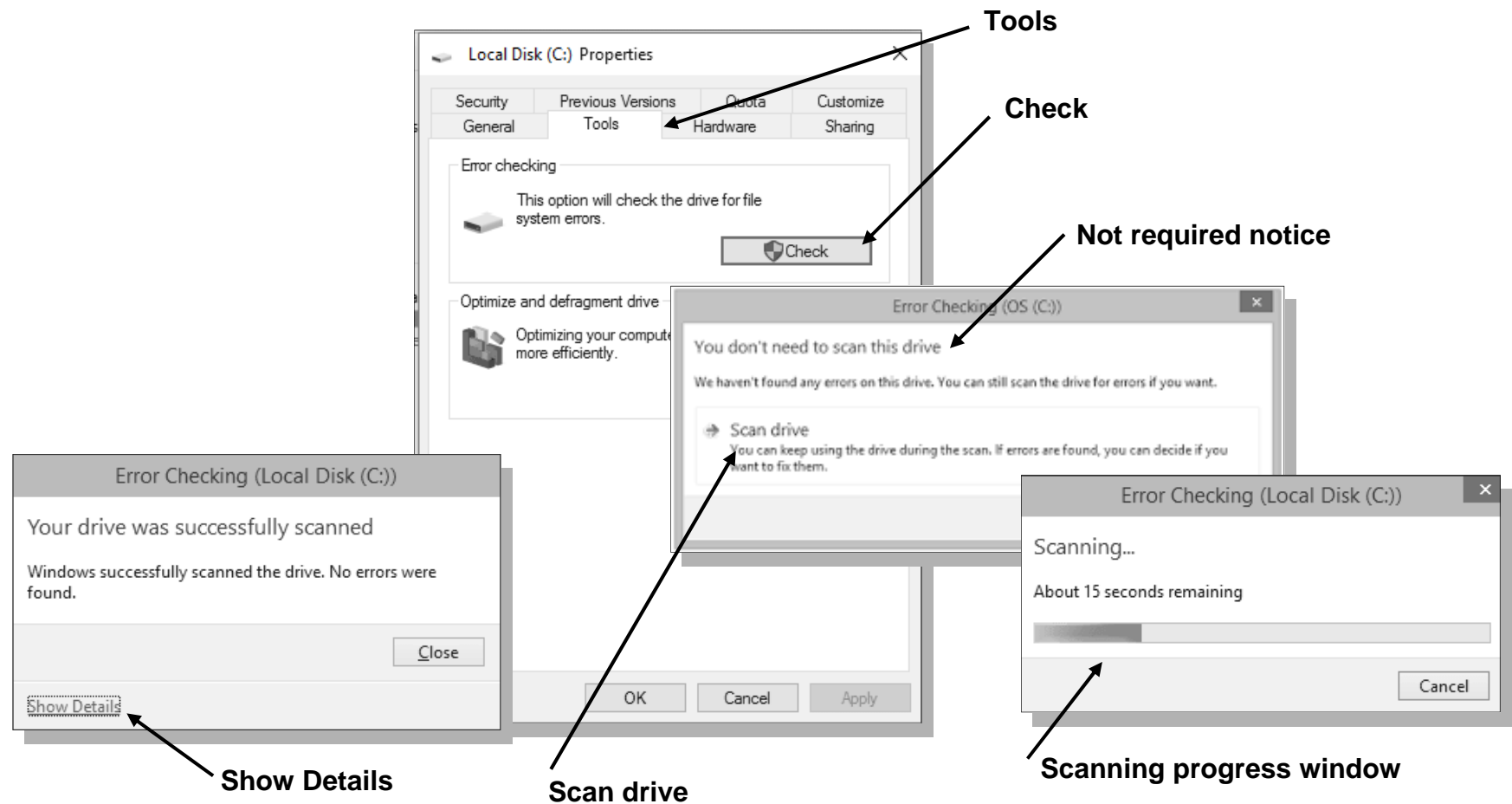
Windows 10 operating system automatically does disk error checking so the need to check for disk errors is not as important as possibly in older operating systems.

To run CHKDSK in Windows 10 you go to the 'Start Menu' and click on 'File Explorer'. On the next window you click on 'This PC' and then you right click on the drive's picture.



In the next window you click on 'Tools', then 'Check' under 'Error Checking'. As we mentioned earlier Windows 10 does disk error checking so you may see a window next that tells you that a disk check is probably not required.

If you still wanted to do a disk check then you click on 'Scan drive' and the utility would start by displaying a progress window. If there were no errors it would inform you. However if there were errors you would click on 'Show Details' and a report would appear showing the errors and solutions.



**Learning  
Activity**

## Task

**LEARNING ACTIVITY ELEVEN** (*WINDOWS 10 USERS ONLY*)

In this activity we want you to locate the 'CHKDSK utility' tool and run this tool on your PC. If this is not your own PC, then make sure you have permission to run this tool.

This activity should be done in front of your teacher or trainer. If you are doing this at work or at home, you will need someone to observe you performing this activity. These persons observing you doing this activity will need to have the skills themselves to do this activity so that they can confidently say you have performed this activity successfully.

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**TEACHER / TRAINER GUIDANCE NOTES**

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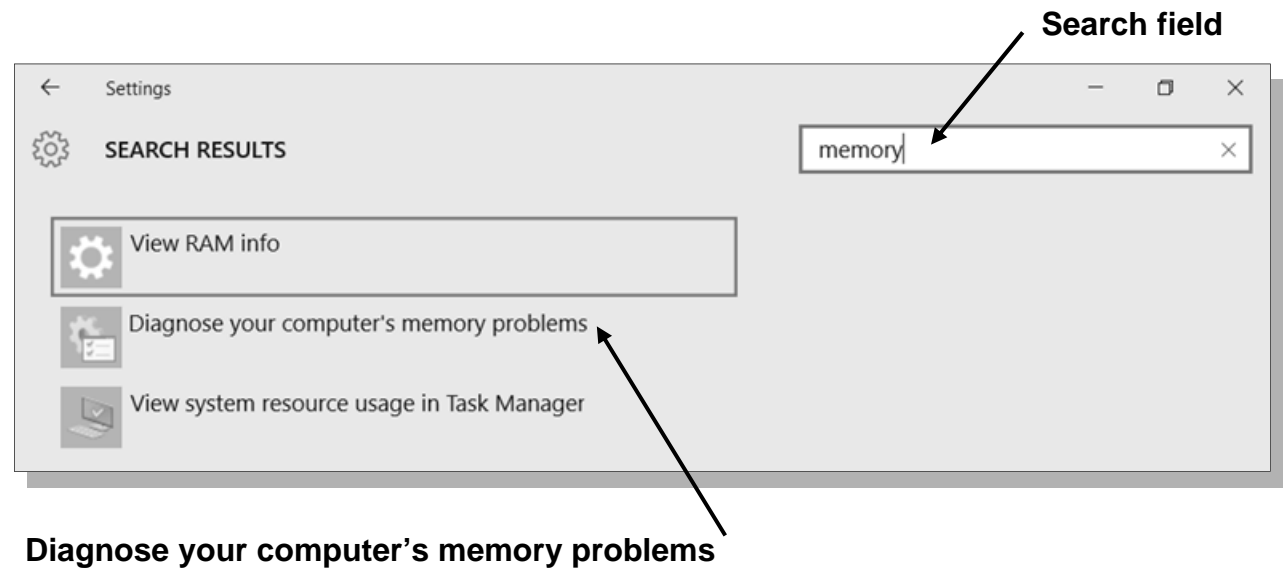
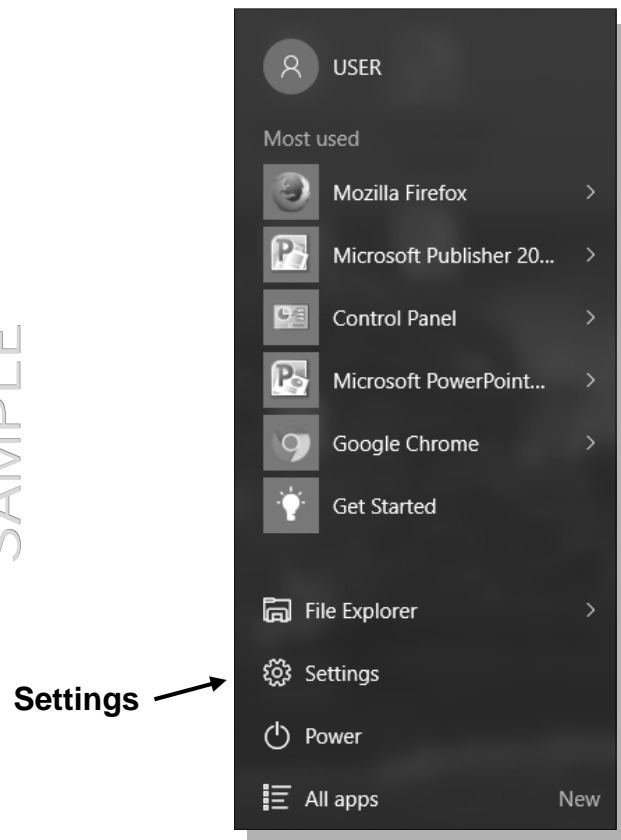
If the student or trainee is undertaking this course at a workplace, then the employer or the supervisor could provide evidence that they observed the student or trainee perform this activity successfully.

## WINDOWS 10 MEMORY TEST

Windows 10 includes built-in features to help you identify and diagnose problems with memory. If you suspect a computer has a memory problem that isn't being automatically detected, you can run the Windows Memory Diagnostics utility.

To do you go to the 'Start Menu' and click on 'Settings' and then in the search field type in 'Memory'. In the new window you click on "Diagnose your computers memory problems".

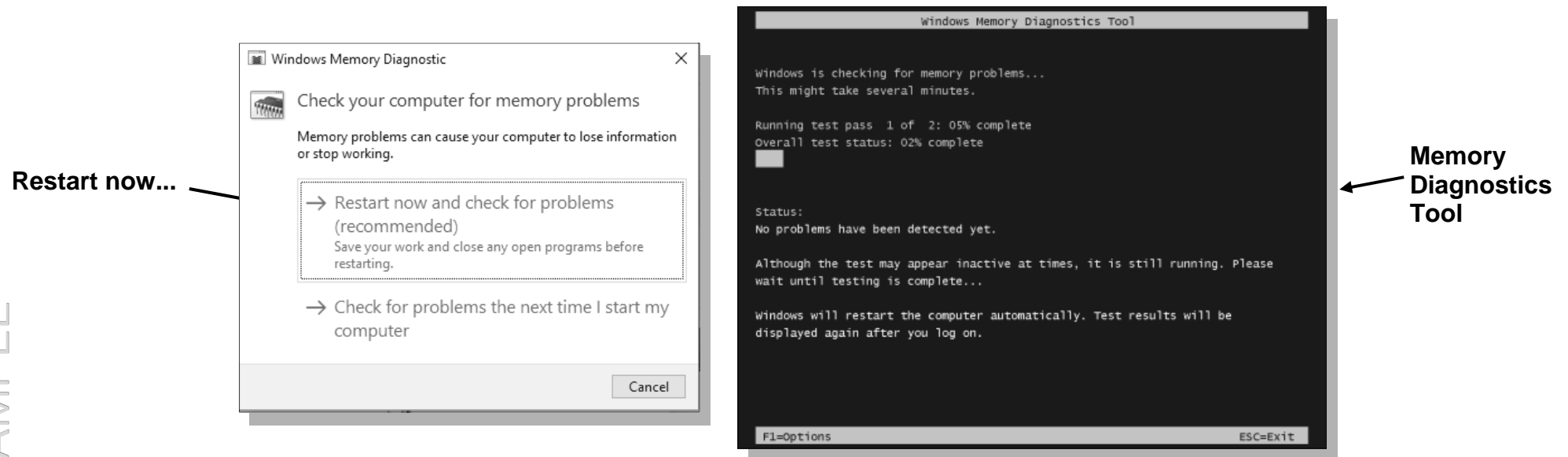
SAMPLE



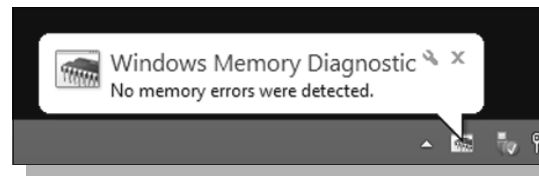
SAMPLE SAMPLE

A window will appear to start the memory diagnostic check. It is important that all programs and applications are closed and you need to be aware that this test can take some time.

If you choose to restart your computer and run the tool immediately, make sure that you save your work and close all of your running programs. The Memory Diagnostics Tool will run automatically when you click on 'Restart now...'.



It might take several minutes for the tool to finish checking your computer's memory. Once the test is completed, Windows will restart automatically and if there are no errors it will let you know.



However, if the tool detects errors, you should contact your computer manufacturer for information about fixing them, since memory errors usually indicate a problem with the memory chips in your computer or other hardware problem.



However, if the tool detects errors, memory errors usually indicate a problem with the memory chips in your computer or other hardware problem. In some cases, the memory modules (RAM chips) might simply not be correctly installed in the motherboard memory socket, which would cause memory errors, even though the modules are not faulty.

Other times you may need to manually take other steps to identify a failing memory component. To do that you would need to open the computer's case and work with the internal hardware. Doing this incorrectly can result in damage to your hardware.

Therefore you should not attempt this if you:

- ☆ have no experience working with computer hardware,
- ☆ are unwilling to take the chance damaging your hardware, or if you
- ☆ have a computer that is still under warranty.

If you do decide to work with your hardware, you should remind yourself of the following recommendations and guidelines before starting:

- ☆ Turn off the computer, and disconnect the power cord from the wall socket.
- ☆ Touch an unpainted metal part of your computer case with your hand to help discharge any static electricity from your body.
- ☆ Do not walk around while working on a computer (walking can produce static electrical build-up). If you do need to walk around after grounding yourself, you should re-ground yourself before working on the computer again.
- ☆ And ideally, wear an antistatic wrist strap as described earlier.

Use procedures similar to the following to identify the faulty RAM chip. Remove all memory modules except for one. Rerun Windows Memory Diagnostic and then do one of the following:

- ☆ If no errors are reported, remove the current memory module and add one from the set of memory modules that you previously removed.
- ☆ If errors are reported, remove the current memory module, making sure to separate it from the other memory modules.
- ☆ Add a new memory module from the set of memory modules that have not yet been tested.
- ☆ Rerun Windows Memory Diagnostic.
- ☆ Repeat this procedure until all the memory modules have been tested.

**Learning  
Activity**

## Task

**LEARNING ACTIVITY TWELVE** *(WINDOWS 10 USERS ONLY)*

In this activity we want you to locate the 'Memory testing' tool and run this tool on your PC. If this is not your own PC then make sure you have permission to run this tool. This tool can take awhile to complete so ensure you have allocated enough time to do so.

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Your teacher or trainer will likely require some type of evidence that you have performed this activity successfully and your teacher or trainer will let you know as to what form this evidence will need to be.

**TEACHER / TRAINER GUIDANCE NOTES**

This is a practice exercise. It helps to reinforce the knowledge that the student has gained in this section. It is best if the student or trainee was able to do this while the teacher or trainer watches.

If the student or trainee is undertaking this course at a workplace, then the employer or the supervisor could provide evidence that they observed the student or trainee perform this activity successfully.



## SYSTEM CONFIGURATION MODIFICATIONS

Once you have run all the necessary diagnostic tools you can start modifying the system configuration to fix any identified issues. If the errors have been found in boot up via a beep test or POST Card it will most likely be a hardware issue. In this case replace the problem component and then run the tests again.

If the diagnostic tool was software based the report will often times provide you with a list of recommended actions. Note these down on paper or if possible, print out the report then process each recommendation in order to fix all the issues. If the diagnostic tool finds an error but has no recommended fix or if the recommended fix does not fix the issue, you may need to do some further research to find a solution.

Once you have fixed the errors that have been identified make sure you run the diagnostics again. Some issues could be hiding others for example your soundcard may not be seated correctly and the driver software might be incorrect. Until you fix the hardware issue you will not see the software issue.

It is also advisable to run a diagnostic tool or utility regularly just to make sure the system is running at optimal efficiency.

**Learning  
Activity**

## Question

**LEARNING ACTIVITY THIRTEEN**

After you have resolved issues and/or fixed any problems, what should be your next step?

***TEACHER / TRAINER GUIDANCE NOTES***

Once you have fixed the errors that have been identified make sure you run the diagnostics again.

SAMPLE SAMPLE

## Maintenance Checklist

Activity	Frequency	Auto?
Scan hard disk file systems for errors	Daily	Yes
Scan for viruses	Daily	Yes
Back up data	Daily	No
Clean monitor screen	Weekly	No
Defragment hard disks	Weekly	Yes
Scan for hard disk read errors	Weekly	Yes
Clean mouse and keyboard	Monthly	No
Check for full hard disk volumes and remove unnecessary files	Monthly	No
Update virus definition files	Monthly	Sometimes
Check power protection devices to ensure they are still protecting the system	Quarterly	No

### PREVENTATIVE MAINTENANCE

There may be a computer preventive maintenance schedule and task checklist in the organisation you work in.

The preventive maintenance procedures will often include external hardware maintenance (including peripherals), however in this unit we focussed on the operating system and internal hardware that works closely with the operating system.

We have looked at numerous tools that operating systems have built in (in particular Windows 7 and Windows 10) that should be run on a regular basis just as a preventative measure.

Small issues picked up early and resolved can avoid bigger issues that may result in significant data loss and possibly internal hardware failure.

Physical cleaning of internal hardware components is often overlooked but in some workplace or home environments, this could be a major issue. Environments may have a higher than normal level of dust and the computers may be in a warmer than normal location, all could contribute to internal hardware failure if the inside of the computer is not cleaned and maintained.

It is sometimes suggested that a check on the computers internal hardware systems and operating system diagnostic testing happen after each major data backup. These should happen after hours so as not to disrupt the workplace and the computer system's users.

To the left we have shown a sample Maintenance Checklist.

You will notice two of the tasks are:

- 1) Scan for viruses
- 2) Update virus definition files

In the next section we look at both of these tasks closer.

**Learning  
Activity**

## Interview

**LEARNING ACTIVITY FOURTEEN**

In this activity we want you to interview six persons that use a PC at work. We want you to ask each person if they are aware of any computer preventative maintenance procedures, schedule or manual at their place of work.

If they have not, ask them to ask when they get back to work and let you know.

Compile your interview results in report form and tell us the first name of each person, their age and what they do at work.

Once your report has been completed present it to your teacher or trainer for review and discussion.

***TEACHER / TRAINER GUIDANCE NOTES***

The likely result of their interview activity will be most have never seen a computer preventative maintenance procedures, schedule or manual at their place of work.

It would be interesting to find out if the student or trainee has ever cleaned the inside of their own desktop PC.

# Section Three

## Scan System for Viruses

SAMPLE SAMPLE

This is not a complete document.  
SAMPLE ONLY

NOTES

SAMPLE SAMPLE