

TEACHER'S NOTES. GENERAL INFORMATION

The activities presented in these materials could be done separately because the lesson plans for these units are aimed to an optional subject in 3rd of ESO, but some of them could be used in technology of 4th ESO or in a different level (as specific activities in English) in a subject taught mainly in L1 (mother tongue).

Some contents and activities are presented in a table format (matching and filling-in activities). Some others are in a diagram, flow chart or concept map form.

Some of these tables and diagrams have extra content in case you want to go in a more detailed way into the subject. This extra content could be neglected in order to obtain a lower order or shorter activity.

The table or diagram presentation allows:

- to show the contents on the student's workbook
- to use the tables to do different kinds of activities with the same content
- to use the table as a part of a test
- to use the table, visual or diagram to explain a concept

When you use the materials the colour on the tables and diagrams could be removed before printing to save colour ink.

UNIT 2 SOFTWARE

The unit starts with this sentence:

**The hardware is the body, the
software is the soul.**

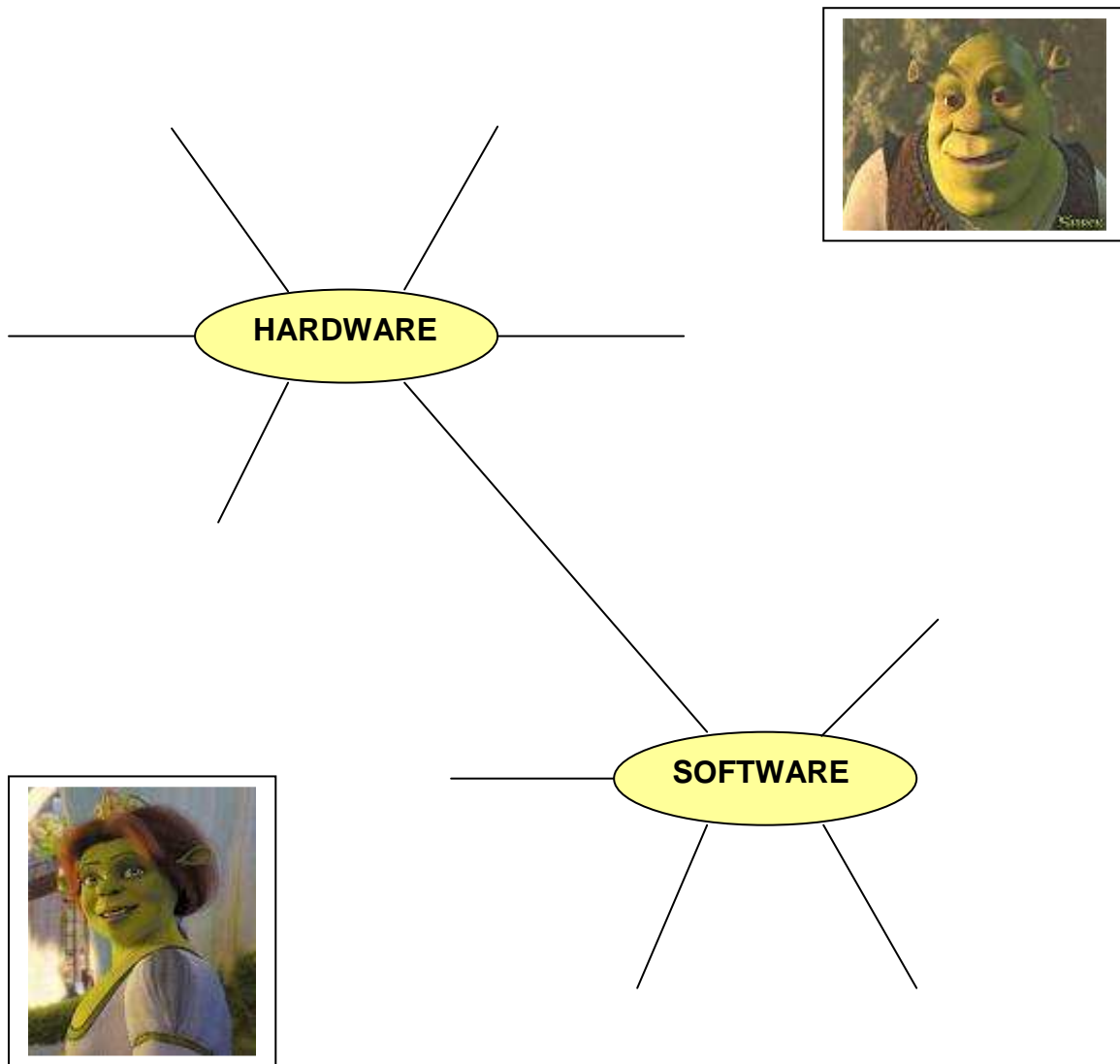
As a warm up activity, the teacher could ask the meaning of the sentence to the students.

The teacher could also comment on the picture. He / She could explain something about the Linux operating system, the GNU foundation and the freeware and shareware movement.

Then, the aim of the following activity (2.1) is to warm up, review (unit 1 hardware) and predict about the next topic (unit 2 software).

@ctivity 2.1

- Write on the board the words HARWARE and SOFTWARE
- Tell the difference between them
- Write some words related to them and do a concept map
- What's the meaning of the line that links both together?



ANSWERS:

Hardware: keyboard, mouse, screen, hard disc drive, RAM, modem, router, webcam, USB memory stick, printer, etc.
















































































Software: programs, applications, operating system, virus, binary code, etc.

The link between hardware and software means that they work always together and one without the other doesn't do anything, like the body and the soul.

@ctivity 2.2

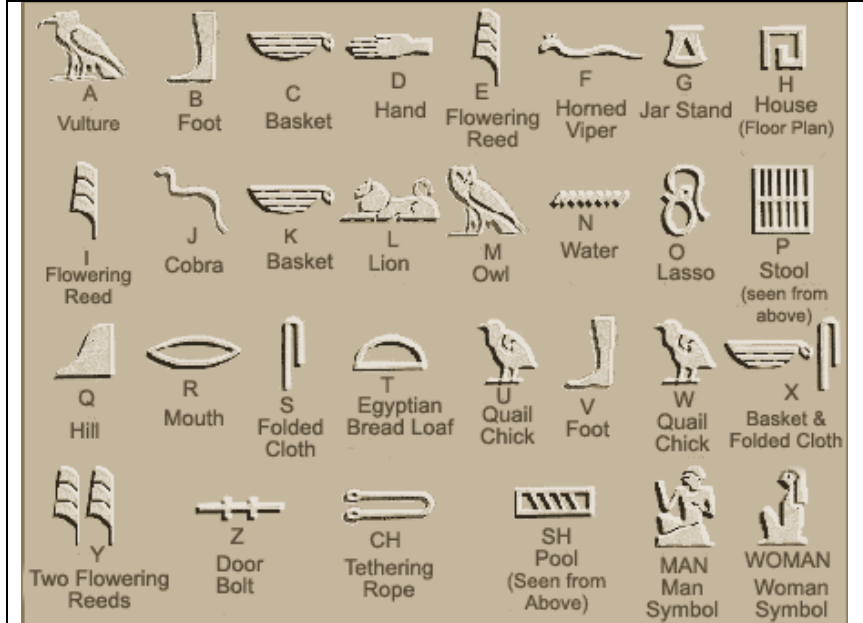
Match these words in the box with the examples of different codes that are given on the table below.

The teacher could use this examples to talk about coding information.

| EXAMPLES | CODES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <p>10011011</p> | <p>Binary code</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| A . - | J . - - - | S . . . | 2 . . - - - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B - . . . | K - . . | T - | 3 . . . - - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C - | L | U . . - | 4 - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D - . . | M - - | V . . . - | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E . | N - . | W . - - | 6 - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | O - - - | X - . . . - | 7 - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| G - - . | P | Y - . . . - | 8 - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H | Q - . . . - | Z - | 9 - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I . . | R . . . | l . - - - - | 0 - - - - - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <p>08450</p> | <p>Post code</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Dec | Hex | Char | Dec | Hex | Char | Dec | Hex | Char | Dec | Hex | Char |
|-----|-----|------|-----|-----|------|-----|-----|------|-----|-----|------|
| 128 | 80 | Ç | 160 | A0 | á | 192 | C0 | Ł | 224 | E0 | α |
| 129 | 81 | ü | 161 | A1 | í | 193 | C1 | ⊥ | 225 | E1 | β |
| 130 | 82 | ë | 162 | A2 | ó | 194 | C2 | ⊥ | 226 | E2 | Γ |
| 131 | 83 | ä | 163 | A3 | ô | 195 | C3 | ⊥ | 227 | E3 | Π |
| 132 | 84 | å | 164 | A4 | û | 196 | C4 | ⊥ | 228 | E4 | Σ |
| 133 | 85 | â | 165 | A5 | ñ | 197 | C5 | ⊥ | 229 | E5 | σ |
| 134 | 86 | ã | 166 | A6 | ª | 198 | C6 | ⊥ | 230 | E6 | μ |
| 135 | 87 | ç | 167 | A7 | º | 199 | C7 | ⊥ | 231 | E7 | Υ |
| 136 | 88 | ê | 168 | A8 | ¸ | 200 | C8 | ⊥ | 232 | E8 | ϕ |
| 137 | 89 | ë | 169 | A9 | ˆ | 201 | C9 | ⊥ | 233 | E9 | Θ |
| 138 | 8A | è | 170 | AA | ˜ | 202 | CA | ⊥ | 234 | EA | Β |
| 139 | 8B | ì | 171 | AB | ½ | 203 | CB | ⊥ | 235 | EB | δ |
| 140 | 8C | î | 172 | AC | ¼ | 204 | CC | ⊥ | 236 | EC | ε |
| 141 | 8D | ï | 173 | AD | ¸ | 205 | CD | = | 237 | ED | φ |
| 142 | 8E | ÿ | 174 | AE | « | 206 | CE | ⊥ | 238 | EE | € |
| 143 | 8F | ÿ | 175 | AF | » | 207 | CF | ⊥ | 239 | EF | ∩ |
| 144 | 90 | É | 176 | B0 | ☼ | 208 | D0 | ⊥ | 240 | F0 | ≡ |
| 145 | 91 | æ | 177 | B1 | ☼ | 209 | D1 | ⊥ | 241 | F1 | + |
| 146 | 92 | œ | 178 | B2 | ■ | 210 | D2 | ⊥ | 242 | F2 | ∑ |
| 147 | 93 | ø | 179 | B3 | ⊥ | 211 | D3 | ⊥ | 243 | F3 | ∑ |
| 148 | 94 | ö | 180 | B4 | ⊥ | 212 | D4 | ⊥ | 244 | F4 | ∑ |
| 149 | 95 | õ | 181 | B5 | ⊥ | 213 | D5 | ⊥ | 245 | F5 | ∑ |
| 150 | 96 | ù | 182 | B6 | ⊥ | 214 | D6 | ⊥ | 246 | F6 | ÷ |
| 151 | 97 | ü | 183 | B7 | ⊥ | 215 | D7 | ⊥ | 247 | F7 | ≈ |
| 152 | 98 | ÿ | 184 | B8 | ⊥ | 216 | D8 | ⊥ | 248 | F8 | ◊ |
| 153 | 99 | ÿ | 185 | B9 | ⊥ | 217 | D9 | ⊥ | 249 | F9 | • |
| 154 | 9A | Ü | 186 | BA | ⊥ | 218 | DA | ⊥ | 250 | FA | • |
| 155 | 9B | Ë | 187 | BB | ⊥ | 219 | DB | ■ | 251 | FB | • |
| 156 | 9C | É | 188 | BC | ⊥ | 220 | DC | ■ | 252 | FC | • |
| 157 | 9D | Ë | 189 | BD | ⊥ | 221 | DD | ■ | 253 | FD | • |
| 158 | 9E | Ë | 190 | BE | ⊥ | 222 | DE | ■ | 254 | FE | • |
| 159 | 9F | Ë | 191 | BF | ⊥ | 223 | DF | ■ | 255 | FF | • |

ASCII code
(American Standard Code for Interchange of Information)



Egyptian hieroglyphics

IV + III = VII

Roman numbers

Activities 2.3 and 2.4 are aimed at activating prior knowledge and predicting. The answers are in the text and through a reading activity the students will find them.

@ctivity 2.3

Tell me 2 or 3 things you know about data compression:

- What does it do?
- What's an example?
- Why is it important?

Look for answers in the text.

COMPRESSION

Compression tries to reduce the size of a file by removing redundant data within the file. By making files smaller, less disc space is used, and more files can be stored on disc.

For example, a 100 KB text file might be compressed to 52 KB by removing extra spaces or replacing long codes with short ones.

A procedure recreates the original data when the file is read. Picture and video files are also compressed. For example, the .jpg image file format uses compression to eliminate redundant pixel data.

Compression is very important in communications when data is sent to a remote place (i.e. using internet) because smaller size files take less time to be sent. In other words, more information can be sent in the same amount of time.

@ctivity 2.4

In 3 minutes predict in pairs:

- What does encryption do?
- How does it work?
- What could be the problem?

Look for answers in the text and compare them with your predictions.

ENCRYPTION

Encryption is used to protect data, preventing unauthorized users from accessing information even if files are hacked or stolen.

Encryption uses a mathematical procedure with a unique key to encode a file into a form that cannot be read.

No one else can access or use the encrypted file until it is unencrypted again using the identical key. Of course, if the encryption key is lost or forgotten, any data encrypted with that key will be inaccessible.

@ctivity 2.5

In your computer go to **START** , then **SEARCH** , select **PICTURES, MUSIC AND VIDEO**, tick on **MUSIC**, and look in your computer for one file of each of the four types shown in the table.

For example, you have to type ***.wav** and then click on **Search** .

In the table:

- Write the file name you have just found
- Write the file size in Kilobytes (KB)
- Play the music file and write down the duration (mm:ss)
- Calculate the ratio size / duration in KB / min
- Answer if it's a compressed data file or if it's not

SOME EXAMPLES:

| FILE NAME | EXTENSION | SIZE (KB) | DURATION (mm:ss) | RATIO (KB / min) | COMPRESSED DATA (Y / N) |
|---------------------|-------------|-----------|------------------|------------------|-------------------------|
| Prova2 | .WAV | 5353 KB | 0:31 | 10360,6 | NO |
| El cant dels ocells | .MP3 | 3054 KB | 3:15 | 939,7 | YES |
| If you leave me now | .WMA | 3735 KB | 3:57 | 945,5 | YES |
| | .MID | | | | |

Key concepts :

ALGORITHM

A set of well-defined rules or procedures for solving a problem in a finite number of steps.

INSTRUCTION

It is a single operation of a computer processor. It is an element of an executable program, such as a byte code.

PROGRAM

It is a sequence of instructions that a computer can interpret and execute.

Programs could be divided into two groups:

| OPERATING SYSTEMS | APPLICATIONS |
|--|--|
| An operating system (sometimes abbreviated "OS") is a set of programs that, after being initially loaded into the computer by a boot program, manage all the other programs in a computer. | The other programs are called applications or application programs and perform many different and specific functions. The application programs make use of the operating system by making requests for services and resources from the system. |

Key functions of an operating system:

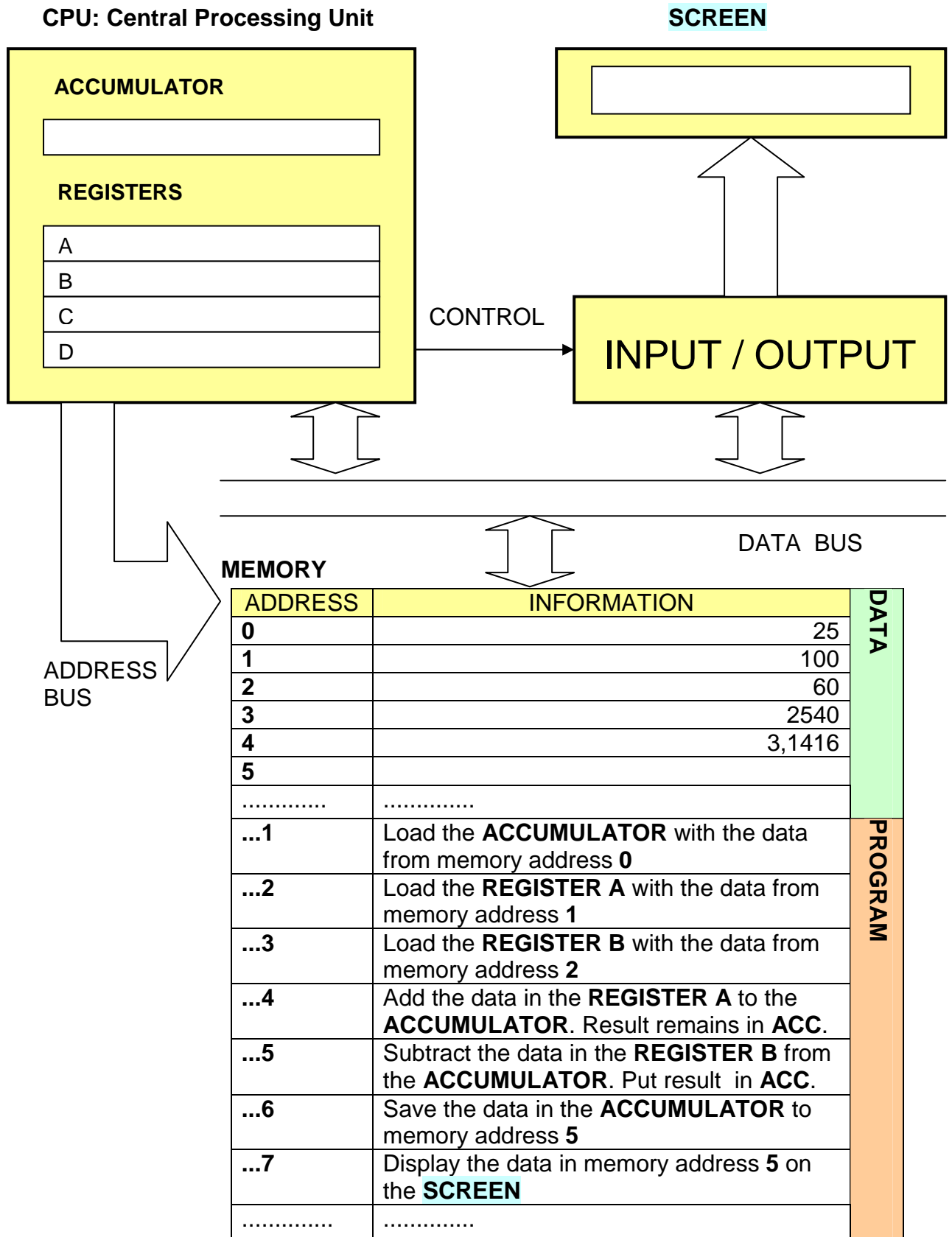
- In operating systems where multiple programs can run at the same time (multitasking), the operating system determines in what order applications should run and how much time is allowed for each application before another application has its turn.
- It manages the sharing of internal memory among multiple applications.
- It handles input and output to and from connected hardware devices, such as hard discs, printers, keyboard, monitor and communication ports.

Examples of operating systems:

| | |
|-----------------------------|--|
| | |
| DOS | That's the old Disc Operating System from IBM and Microsoft |
| UNIX | Originally from 1969 has evolved to a large freeware product |
| LINUX | Unix-based freeware operating system |
| WINDOWS XP WINDOWS VISTA | Nowadays Microsoft operating systems |
| Mac OS X | Apple Macintosh operating system version 10 |

@ctivity 2.6

Follow the 7 steps of the **PROGRAM** below. What's the result on the **SCREEN** after the steps (...1 to ...7)?



In the activity 2.6 the students have to follow a list of instructions (steps 1 to 7) which is a program. This activity gives an idea on how a computer works to perform an addition of two numbers stored in the memory step by step. The result is then saved in the memory and presented on the screen.

ANSWERS (after step 7 is completed):

ACCUMULATOR = 65
 REGISTER A = 100
 REGISTER B = 60
 MEMORY ADDRESS 5 = 65
 SCREEN = 65

@ctivity 2.7

- Put the corresponding number beside the statements to match the terms in the first column
- Students will read one term each and the corresponding statement to the class and their mates will tell him / her if it is correct.

ANSWERS:

| TERMS | |
|---------|----|
| MP3 | 1 |
| DVD | 2 |
| JPG | 3 |
| PROGRAM | 4 |
| HACKER | 5 |
| MIDI | 6 |
| VBASIC | 7 |
| LINUX | 8 |
| VIRUS | 9 |
| ENCRYPT | 10 |

| | STATEMENTS |
|----|---|
| 8 | Unix based freeware operating system |
| 6 | Electronic instruments that can be connected to computers |
| 7 | Language for writing a computer program |
| 9 | Small program that infects your computer and reproduces itself |
| 2 | Watching movies at home |
| 3 | Compressed data format for saving pictures |
| 10 | Converting data to secret code to make it secure |
| 5 | Someone who tries to access a computer network system illegally |
| 1 | Listening to music on your computer or from internet |
| 4 | A sequence of computer instructions |

Application programs:

@ctivity 2.8

- Divide the class in 2 teams (A , B). Hand out the table to the students
- In pairs students write 2 correct definitions and 2 wrong definitions using the table and the language frame provided
- Both teams turn the handout down
- Ask 2 or 3 pairs from team A to read out their 4 statements
- Team B listens and decides if they are true or false. Correct answers get 1 point.
- Then ask 2 or 3 pairs from team B and they do the same

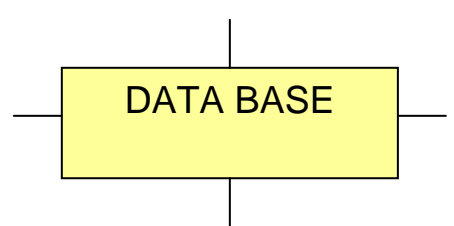
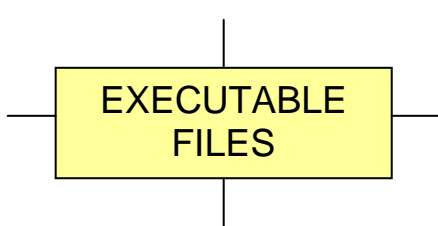
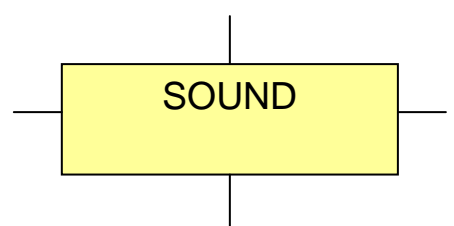
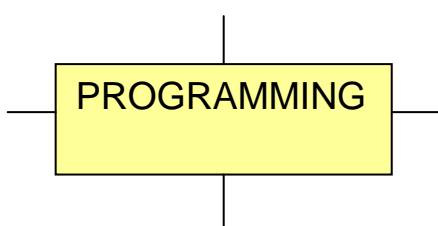
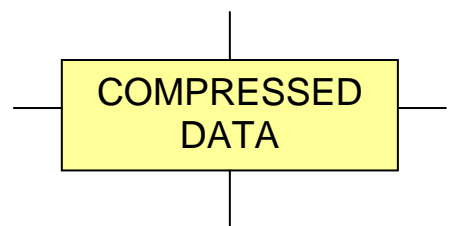
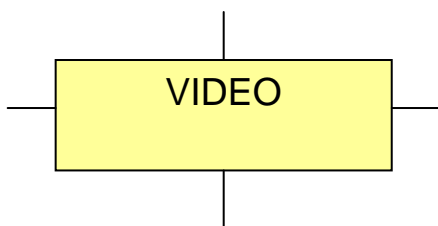
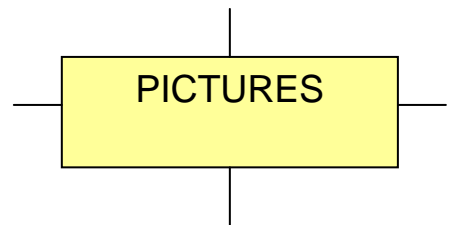
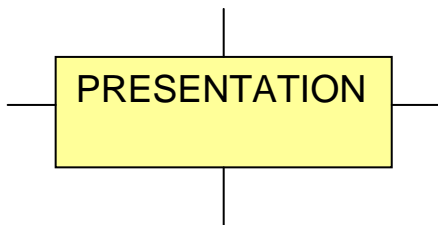
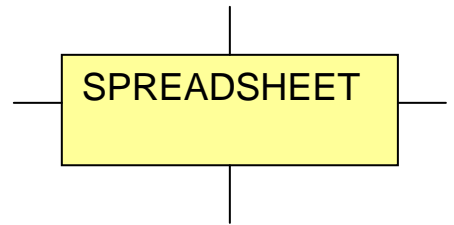
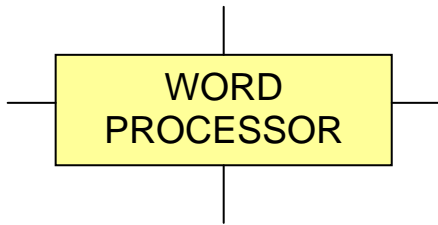
| SOFTWARE | FUNCTION |
|----------------------|---|
| WORDPROCESSOR | Creating and editing texts |
| SPREADSHEET | Performing calculations using formulas and presenting data graphs |
| DATABASE | Storing data so it can be easily searched and sorted |
| GRAPHICS | Create and edit drawings and pictures |
| GAMES | Playing different sorts of games |
| PRESENTATION | Creating multimedia slide shows |
| INTERNET | Searching websites, chatting, sending messages, making phone calls and video conferencing |
| WEBSITE EDITOR | Creating and editing web pages |
| IMAGE EDITOR | Editing graphic images and pictures |
| DEVELOPER TOOLS | Writing and editing computer programs or applications |
| SOUND & VIDEO EDITOR | Editing sound and video files |

| | | | | | |
|---|-----------|----------|-------|---|-----|
| X | is are | software | which | create perform store play search edit write | ... |
|---|-----------|----------|-------|---|-----|

EXAMPLE: A word processor is software which creates and edits texts.

@ctivity 2.9

Write down any words you know (related to programs or files) connected with the types of software that are in the boxes below. After 5 minutes the teacher is going to read 20 more words and you have to write them down where they belong.



ANSWERS: (2.9) The teacher could read 20 names of programs, types of files or file extensions from this table. The students will complete their initial task.

TYPES OF SOFTWARE: *MOST COMMON FILE EXTENSIONS AND PROGRAMS

| SOFTWARE / INFORMATION | FILE EXTENSION | | PROGRAMS / FILES |
|------------------------|---|----------------------------------|--|
| WORDPROCESSOR | .txt .rtf .doc .docx .wpd .odt | * * * * | Common text files Rich Text Format MS Word 97-2003 MS Word 2007 Corel WordPerfect document Open Office Writer document |
| SPREADSHEET | .xls .ods | * * | MS Excel Open Office Calc document |
| DATA BASE | .mdb .sql .csv | | MS Access Data Base Structured Query Language Comma Separated Value file |
| PRESENTATION | .ppt / .pps .pdf .htm / html .xml | * * * | Power Point document Adobe Acrobat Reader HTML file – Web page XML document |
| PICTURES, DRAWINGS | .jpg / .jpeg .gif .bmp .dwg .odg .psp .cur .ico | * * * * | Joint Picture Experts Group Graphics Interchange Format Bit Map file AUTOCAD drawing Open Office Draw document Paint Shop Pro Cursor file Icon file |
| SOUND | .wav .mp3 .wma .mid .cda | * * | Wave sound file Music file Windows Media Audio Midi music file Compact Disc Audio |
| VIDEO | .avi .wmv .flv .mov .rm .swf .divx .xvid .vob | * * * * | Audio Video Interleave Windows Media Video Flash Video Apple QuickTime movie Real Media file Macromedia Flash movie DivX encoded movie Xvid encoded movie DVD video (Mpeg-2 movie) |
| COMPRESSED DATA | .zip .rar .cab | * | Zipped file WinRAR compressed file Windows Cabinet file |
| EXECUTABLE FILES | .exe .com .bat | * | Executable program file Command file DOS batch file |
| PROGRAMMING | .vbp .bas .pas .dll .js .php .cpp | * | Visual Basic Project file Basic Source Code file Pascal Source file Dynamic Link Library Java Script file Hypertext Pre-Processor file C++ Source Code file |

@ctivity 2.10

- Work in groups of three (A, B and C)
- Each student in the group chooses 3 different paragraphs from the text below
- Read and underline the words you don't know
- A, B and C write 3 questions as headings for their 3 paragraphs

POSSIBLE ANSWERS:

| | |
|----------|--|
| 1 | WHAT IS PROGRAMMING? Programming can be defined as the implementation of an algorithm in a computer language. This forms the basis of computer usage made up of two sections: information management and word processing. |
| 2 | WHAT ARE THE BASIC QUESTIONS? Why is programming necessary? Why develop algorithms? Why not just use the software available? We have software for just about everything these days. Even software that generates code. The answers would require more questions. Who makes this software? How are they made? |
| 3 | WHAT IS A COMPUTER? To answer these questions I will have to take you back to the very basics of computers. A computer is, very simply, a set of input, output and memory devices connected to a processor, all of which are connected to a power source. |
| 4 | WHAT DO COMPUTER PROGRAMS DO? Programs have to use input devices to get data to the processor chip, access the memory and output devices and achieve the desired output. |
| 5 | WHAT IS THE BINARY CODE? The processor only accepts two kinds of inputs, one and zero: the binary code. In the earlier days where the output consisted mainly of punched cards, the input was also given in ones and zeros which is now known as the machine language. |
| 6 | WHAT DOES THE ASSEMBLER DO? But then as the hardware became more powerful and more complicated inputs were introduced, an interpreter called the assembler, that was stored in the memory, was developed. It was given instructions in written words that would then be translated to the corresponding machine language command (or commands) and passed on to the processor. |
| 7 | WHAT ARE THE INTERPRETER AND THE COMPILER? This was a cycle that led to more and more powerful computers and languages. But still the basis remains the same. Every language comes with an interpreter that converts the language to the machine language. The more advanced ones now have compilers, which make a file of all the interpreted machine language instructions called an executable (.exe) file. |
| 8 | WHICH PROGRAMMING LANGUAGE IS THE BEST? Which language is the best is a rhetorical question. Each language has its advantages and disadvantages. The older ones (low level) are a lot more basic and take longer to code. But they execute faster and have greater capabilities such as interaction with registers, ports and system memory. |
| 9 | WHAT ARE THE ADVANTAGES AND DISADVANTAGES OF HIGH LEVEL PROGRAMMING LANGUAGES? The high level languages are easier to use, have many built-in functions (which execute a large set of instructions at once) and are good for large projects. But for the basics of system programming, there's nothing like the assembler or maybe C. |

Use the table below to introduce the two types of programming languages, compare them and talk about some examples.

Programming languages:

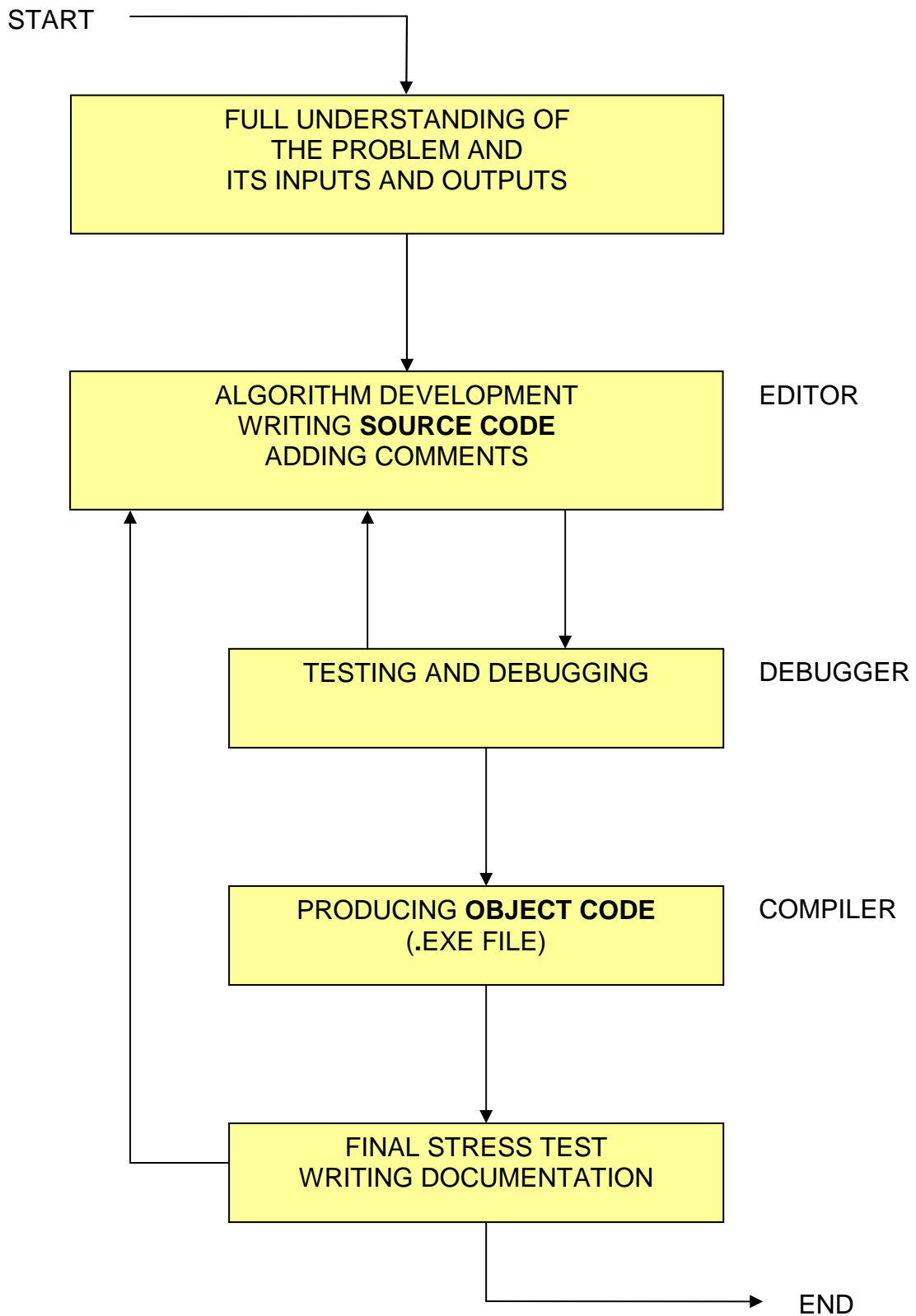
| TYPES | | EXAMPLES |
|------------|---|---|
| LOW LEVEL | Binary codes or its derivatives, closer to the machine hardware | Machine code Machine language Binary code Hexadecimal code Assembler |
| HIGH LEVEL | More similar to our written and spoken languages, closer to human languages | Fortran (1954) BASIC (1963) Pascal (1970) Turbo Pascal C (1972) Logo Visual C++ Visual Basic SQL Java HTML PHP ... |

PROGRAMMING PROCESS DIAGRAM:

Use the block diagram on page 15 to explain the basic steps in the programming process. If you want to go deeper into the subject the words editor, debugger, source code, object code, compiler and executable file could be explained.

The teacher can find some explanations on page 16 under the title of **Key concepts**. This is an optional part for those who want to know more about the topic.

On page 16 as well, under the title of **Programming steps reminder** there is a different way, in five steps, to present the programming process.



@ctivity 2.11

Look at the above diagram. What do you think it explains?

- A/ a classification process
- C/ a programming process

- B/ a project writing process
- D/ an object manufacturing process

Key concepts:**Editor**

In computer science, it is a program that allows the user to write, modify and store programs as text files.

Debugger

A tool for tracing program execution that helps to detect software errors (bugs).

Translators

To get from your programming language down to the binary instructions the computer processor understands, some form of translation is required. Translators come in two general types:

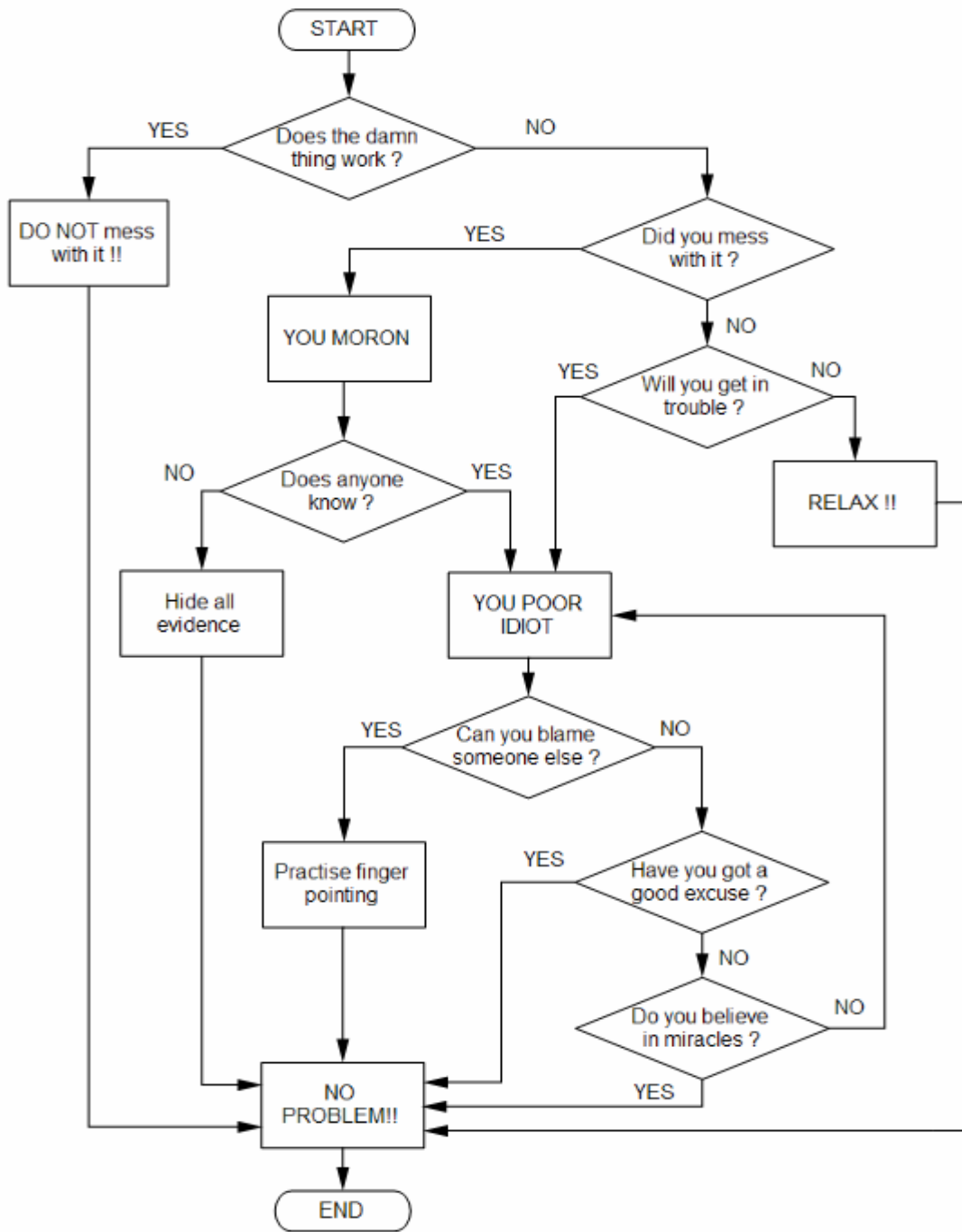
- **Compiler:** Translates an entire program at one time then executes it.
 - Compiled programs execute much faster.
 - Compilation is usually a multi-step process.
 - Compilers do not require space in memory when programs run.
- **Interpreter:** Translates a program line at a time while executing.
 - Interpreted programs are slower because translation takes time.
 - Interpretation translates in one step.
 - Interpreters must be in memory while a program is running.

Programming steps reminder:

In all cases, when programming (whatever the language) remember the five steps to create a good program:

- Define the problem - Make clear statements – Understand it
- Plan the solution - Create a logical outline – Develop the algorithm / flowchart
- Code the program - Use the programming language - (EDITOR)
- Test the program - Try everything - (DEBUGGER – COMPILER)
- Document everything - Use comments and write a manual

Programming isn't hard, it just takes time!



@ctivity 2.12

A/ Read and follow all the paths of the flow chart above. Underline the vocabulary you don't know.

B/ Find a route where you are caught in a loop and never get to the “NO PROBLEM!!” ending box.

C/ Tell the class one sentence each using what's written in the boxes and rhombus of the flowchart. Use this language frame:

| | | | |
|----|---|------|---|
| If | [affirmative sentence] [negative sentence] | then | [+ or – sentence] [interrogative sentence] |
|----|---|------|---|

ANSWERS: (2.12)

Part A : The aim of this warm up activity is, while reading, to have some fun introducing the flow chart as a graphical way to present a process.

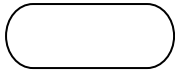
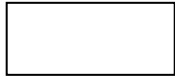
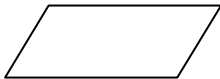
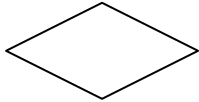
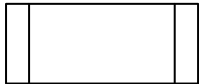


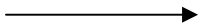
Part B: If you can never blame anyone else and you haven't got a good excuse and you don't believe in miracles you are caught in a loop that always goes back to the "YOU POOR IDIOT" box.

Part C: Grammatical accuracy is not the aim here.

Examples: If you can blame someone else, then practice finger pointing.
If the damn thing works, then do not mess with it!

ANSWERS: (2.13)

This matching activity introduces the symbols most commonly used in flow charts or flow diagrams.

| SYMBOLS | MEANING | NAME / DESCRIPTION |
|---|-------------------------------------|---|
|  | TERMINATOR (START / END) | Rectangle with right and left rounded sides |
|  | PROCESS, BASIC OPERATION | Rectangle |
|  | DATA INPUT / OUTPUT | Rhomboid |
|  | DECISION | Rhombus |
|  | SUBPROGRAM, SUBROUTINE OR PROCEDURE | Rectangle with parallel lines on right and left sides |
|  | ON-PAGE CONNECTOR | Circle |
|  | OFF-PAGE CONNECTOR | Irregular pentagon |
|  | FLOW OF EXECUTION | Arrow |

@ctivity 2.13

A/ Match the symbols and meanings of the table above with the names and descriptions given below :

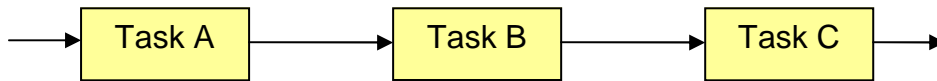
circle, arrow, rhombus, rectangle, rectangle with right and left rounded sides, rhomboid, rectangle with parallel lines on right and left sides, irregular pentagon

B/ In pairs choose 4 symbols and draw a repeated pattern. Show it to your partner and ask them to tell you the meaning of the symbols.

Basic algorithm structures:

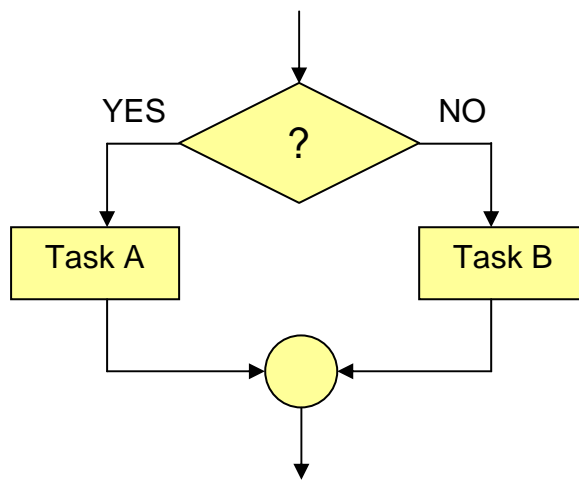
A/ LINEAR OR SEQUENTIAL:

Steps or basic operations are done one after the other following a single row.



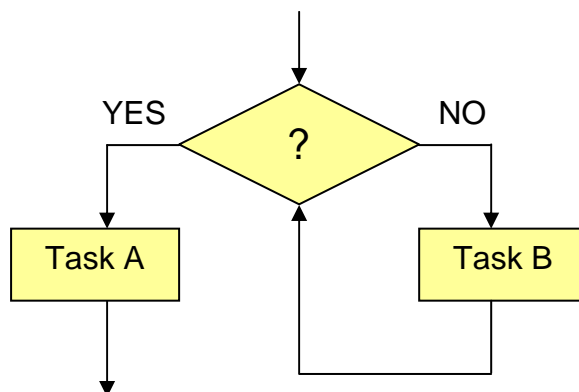
B/ CONDITIONAL (DECISION):

After a condition is met or not the program has to follow one path and not the other.



C/ ITERATION (LOOP AND REPEAT):

The program can enter a repetition loop and every time it does the loop a condition is checked and depending on the answer either the execution of the program leaves the loop and so the repetition ends or continues doing the repetition loop.



This glossary is aimed to introduce new contents and could be used as a matching activity or as a loop game as shown on next page (activity 2.14). The teacher will decide which goes first: introduce the contents or do the activity.

Glossary:

| WORDS | MEANINGS |
|-------------|--|
| COPYRIGHT | Exclusive rights to reproduce, sell and distribute a work, prepare derivative works and display the work publicly. |
| SOFTWARE | In general, the programs and instruction sets that run on a computer. |
| FREWARE | Software that is free to use (requires no payment), but the author retains the copyright. |
| SHAREWARE | Software programs that are distributed on a trial basis by independent programmers. These programs are not free, but are inexpensive and the distribution is informal, with payment and registration requested on a voluntary basis. |
| INSTRUCTION | It is a single operation of a computer processor. It is an element of an executable program, such as a byte code. |
| PROGRAM | It is a sequence of instructions that a computer can interpret and execute. |
| ALGORITHM | A set of well-defined rules or procedures for solving a problem in a finite number of steps. |
| BUG | In computer science, a fault or defect in a system or computer program. |
| DEBUGGER | A tool for tracing program execution that helps to detect software bugs. |
| EDITOR | In computer science, it is a program that allows the user to write, modify and store program and text files. There are audio and video editor programs too. |
| COMPILER | It is a computer program that translates a text file written in a high level computer language (source code) into binary language (object code = machine code). |
| INTERPRETER | In computer science, it is a program that translates and executes source language instructions one line at a time |
| SOURCE CODE | Computer program instructions written as a text in a high level language |
| OBJECT CODE | Computer program written in binary code (machine language) that usually is saved as a .exe file |
| BASIC | Old programming language. (Beginners' All-purpose Symbolic Instruction Code) |
| HTML | Programming language used in web page design. (Hyper Text Mark-up Language) |
| PHP | Programming language used in dynamic web page design. (Hypertext Pre-Processor) |

@ctivity 2.14

To do this activity (loop game) you have to cut in strips a copy of this page. Each strip has got a definition at the top and a word at the bottom and is given to each student. A student starts reading its definition from the paper and the rest of them have to listen to it. The student with the word that matches the definition says the word aloud and then reads its definition (the one on his paper) and the task goes on until the loop is closed.

| |
|--|
| Exclusive rights to reproduce, sell and distribute a work, prepare derivative works and display the work publicly. |
| FREWARE |
| In general, the programs and instruction sets that run on a computer. |
| BUG |
| Software that is free to use (requires no payment), but the author retains the copyright. |
| EDITOR |
| Software programs that are distributed on a trial basis by independent programmers. These programs are not free, but are inexpensive and the distribution is informal, with payment and registration requested on a voluntary basis. |
| COMPILER |
| It is a single operation of a computer processor. It is an element of an executable program, such as a byte code. |
| SHAREWARE |
| It is a sequence of instructions that a computer can interpret and execute. |
| INSTRUCTION |
| A set of well-defined rules or procedures for solving a problem in a finite number of steps. |
| PROGRAM |
| In computer science, a fault or defect in a system or computer program. |
| ALGORITHM |
| In computer science, it is a program that allows the user to write, modify and store program and text files. There are audio and video editor programs too. |
| SOURCE CODE |
| It is a computer program that translates a text file written in a high level computer language (source code) into binary language (object code = machine code). |
| OBJECT CODE |
| Computer program instructions written as a text in a high level language |
| SOFTWARE |
| Computer program written in binary code (machine language) that usually is saved as a .exe file |
| COPYRIGHT |

@ctivity 2.15

Copyright questionnaire.

- Individually write in the OPINION column in the table next page
- In pairs, compare your opinions using the language frame provided
- Be ready to answer some questions about one issue from the table

LANGUAGE FRAME:

| START WITH | AGREEING | DISAGREEING |
|----------------------|-----------------------|--------------------------|
| I think ... | Yes, I agree with ... | I'm afraid I don't agree |
| In my opinion... | OK | I completely disagree |
| If you ask me ... | You're right | I don't think so |
| Another point is ... | | |

CODE FOR THE TABLE:

P = Describes the previous situation before the action:

- A = You buy / have got a legal CD or DVD
- B = You rent a legal CD or DVD
- C = You borrow a legal CD or DVD from the library

TEACHER'S NOTES:

The objectives of this activity are: make the students read, think, give opinion and speak. About the LAW, this could be different in every country and difficult to know the terms and the fines exactly. For that reason this part could be treated as a possibility for the students to communicate what they know about it or what they think about it (opinion). This could encourage the students talking about personal experiences and opinions and could be used by the teacher to talk about copyright and intellectual property issues.

| # | P | ACTION | OPINION Is it right ? | LAW Is it against the law ? | FINE / PRISON |
|----|-------|--|--------------------------|-----------------------------------|------------------|
| 1 | A/B/C | Copy it for my own use (1 copy only) | | | |
| 2 | A/B/C | Copy it to give it away or lend it to a friend | | | |
| 3 | A/B/C | Copy it to sell to somebody (top blanket street sellers) | | | |
| 4 | A/B/C | Copy it more than once for my personal use | | | |
| 5 | A/B/C | Lend it to a friend so they can listen to or watch it | | | |
| 6 | A/B/C | Convert CD Audio tracks to a different format (MP3, WMA) for my own use | | | |
| 7 | A/B/C | Share your music & video files stored in the computer | | | |
| 8 | | Download music & video files from internet | | | |
| 9 | | Buy a CD / DVD that could be an illegal copy | | | |
| 10 | A/B/C | My friend copies that CD / DVD | | | |
| 11 | A/B/C | If I record a CD / DVD with material from different sources that I own | | | |
| 12 | | To pay a copyright tax when you buy a blank CD / DVD disc even if you only copy your own work on it. | | | |
| 13 | | To pay a copyright tax when you buy a Hard Disc Drive, an MP3 player or a Memory Card | | | |
| 14 | A/B/C | If I edit and modify sound or images from a CD / DVD to test and learn and for my own use | | | |
| 15 | A/B/C | Can I copy it since blank CD / DVD already pay a copyright tax ? | | | |
| 16 | A/B/C | How many people can listen to / watch it at home to be considered a private session ? | | | |
| 17 | | The problem is in some actions (copy, lend, share, download, give away, borrow) or is in some uses (private, community, public) or in some commercial issues (sell, rent). | | | |

@ctivity 2.16

This is an extensive list of exercises where the teacher can choose from to make the students practice the design of flow diagrams of programs and processes.

FLOW CHART ACTIVITIES

A1/ Draw a flow chart of a program that :

- Asks the user for the radius of a circle (input)
- Calculates the length and the surface of that circle
- Shows the results on the computer screen (output)
- Asks “Do you want to continue?” at the end of the program

The input data must be entered using the keyboard.

A2/ Draw a flow chart of a program that :

- Asks the user to enter two numbers, A and B (input)
 - Compares them ($A > B$, $A < B$ or $A = B$)
 - Shows the results on the screen using text sentences (output)
-

A3/ Draw a flow chart to describe the process that an automatic washing machine follows.

The process includes prewashing, water warming up to a desired temperature, detergent input, softener input, rinses and centrifuge drainage

A4/ Draw a flow chart of a procedure to calculate the square value of the first 100 whole numbers (integers) and shows the results on the screen.

A5/ Draw a flow chart of a program that :

- Calculates the multiplication table of the number 5
 - Shows the results on the screen (output)
-

A6/ Draw a flow chart of a program that calculates and shows the multiplication table of a number chosen by the user.

A7/ There is a pile of white and black objects. Following a program, we want the arm of a robot to put the white objects in place A and the black ones in place B. When objects are over, the robot must stop. Draw the flow chart of this program.

A8/ In a street, there is a pedestrian crossing with a traffic light control device. Draw a flow chart of the procedure that follows the control device when a pedestrian presses the button to ask for crossing the street.

A9/ Draw a flow chart of the itinerary a 1st ESO student can follow within our present Educational system until he gets a job.

A10/ Draw a flow chart of the process that an automatic teller (working with credit card and/or savings book) follows to consult the balance and to pay into or withdraw money from an account. It must work with a Personal Identification Number (PIN).

A11/ There is a heating system with a thermostat to select the temperature in a room. This thermostat controls the working (switch on/off) of a boiler when the temperature in the room varies half degree below or above the selected temperature. Draw the flow chart of this control system.

A12/ Draw a flow chart to control a three-storey lift.

A13/ We need to control the number of people in some premises for what we install an electronic device that counts the people going in and out. The total amount of people will be shown on a screen (output). Draw the flow chart of this control system.

A14/ Draw a flow chart of a procedure to count the length of a word.

A15/ Draw a flow chart of a program that counts the number of words in a text.

A16/ Draw a flow chart of a stock control in a warehouse for a single item with maximum, minimum and generation of an automatic order.

A17/ There is a labyrinth made with straight and 90 degree curved stretches. Draw a flow chart to command a robot with simple movements (forward, turn 90 degrees, right, left, etc) with the aim of getting the robot out of the labyrinth.

A18/ Draw a flow chart of a program that checks the RAM memory of a computer from 0 to 4GB.

A19/ Draw a flow chart of a program to control the entrance to a car park with an automatic barrier . There must be a button to open the barrier, a presence detector for a car under the barrier, a full/spaces indicator and a ticket teller at the entrance. Once the barrier is open, it must close after 30 seconds if no vehicle is under it.

A20/ Draw a flow chart of the regulation of a double tap system (cold and hot water inputs and mixed water output) with temperature setting made by the user (thermostatic tap).

A21/ Draw a flow chart of a taximeter taking into account the rate of the start of the trip, the price for the distance covered, the price for waiting time, and the possibility of including extras according a schedule rate. If possible, get real information from taxicabs in your town.

A22/ Draw a flow chart for the operation of a petrol pump that can have a maximum pre-established amount in euros.

A23/ Draw a flow chart of an automatic Hotline service.

A24/ Draw a flow chart of the operation of a garage automatic door activated by a remote control and with automatic closing after a given time. To prevent damage, it must include a security system to make the door go up again if it detects a vehicle under it.

A25/ There is a water tank with two level detectors (a maximum at the top and a minimum in the middle). We want to control a water pump to have the tank always with water but avoiding it to overflow or to be completely empty. Draw the tank, the detectors, the pump and the pipes. Also draw the flow chart of the operation of this control system.

A26/ Draw a flow chart of a program to calculate the square root of a number given by the user. The process must give an error message when the given number is negative.

A27/ Draw a flow chart of a program that allows to solve general quadratic equations ($ax^2 + bx + c = 0$).

- The user has to enter the values for a, b and c (input)
- The program will give the results x_1 and x_2 (output)

@ctivity 2.17

SELF ASSESSMENT UNIT 2

| Name: | Date: | | |
|---|------------------|-------------------|-----------------------------|
| Can do: | Very well | Quite well | Needs to be reviewed |
| Differentiate types of information, files and applications. | | | |
| Classify different types of programming languages. | | | |
| Understand and follow flow diagrams and instructions. | | | |
| Draw flow charts for a given process or computer program. | | | |
| Differentiate operating systems and application programs | | | |
| Explain the process of programming | | | |
| Talk about the freeware and shareware movement | | | |
| Talk about copyright issues | | | |
| Communicate what you have learnt | | | |