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TLS3008, TLS6036, and TLS6065 *only***
Lesson Design Thinking Project (TDG)

Lesson Plan

Supervisor	Dr LAM Bick Har		
Venue	Computer Room	**Duration**	1 hour × 2
Class	Form 4 ICT	**Students**	12
Module	Basic Machine Organisation	**Topic**	System Unit of Computer

A. Students' Prior Knowledge

Before the lesson, students are expected to be able to…
1. recognise desktop computer and monitor; and
2. use screwdrivers to tighten logic board and other components.

B. Learning Objectives (LOs)

By completing the lesson, students will be able to…
1. describe the usage of computer system units;
2. explain the advantages and disadvantages of system units;
3. evaluate the choice for computer hardware; and
4. build a personal computer on their own.

C. Teaching Procedures

Time	Activities
15	**Introduction** Students will have to complete the Pre-lesson Worksheet, appended in *Lesson Material – (1)*, before the lesson. Students will have to complete a part of individual work, which serve as a pre-test tool for the teacher understanding of students' background in computer hardware. The second part of the worksheet requires students to work in groups to study a particular hardware. As the lesson aims to give a fundamental understanding to all students. Students are required to search for the usage and latest development of a component, and to search three available products on the market. Then, they will have to prepare a poster-like presentation material in any format (without anything larger than a piece of A3-sized paper). Students will have their mini presentations (not longer than 2 minutes) in class. By preparing the presentation material and having the presentation, students' knowledge on the particular hardware could be deepened. The poster may help students to organise the ideas graphically, which suggested for better understanding cognitively.

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After each presentation, students will be invited to share their comments and suggestions for the other groups' presentation. This may help students to be more engaged in class and create a positive classroom atmosphere. Besides, peer evaluation may help students to learn how to improve his/her learning.

Then, the class will move forward by asking students whether they know why a computer will 'beep' when it fails to turn on. This question will bring them to the Direct Instruction, which introduces them the components.

15	**Direct Instructions**
	The students will be informed the schedule in this lesson, and students will be calmed for the excitement by saying 'I know you all are excited for building a computer today but let me talk a little bit more about the hardware so that we know more about it before doing it.
	Several major hardware components will be introduced to students, including CPU, RAM, Cooling Fans, Motherboard, HDD, SSD and Display Card. It is expected students may recognise the appearance of the hardware modules and describe it basic usage in simple language (for example, 'RAM is just like working memory as our brain').
	Then, a tutorial video of building a computer will be shown to the students as that may give a visual impression for what is coming in the next part. At the same time, students may clear up their cognitive load for receiving the information of the hardware introduced. That might prevent cognitive overloading students and ensure that graphical learners may have better idea.
	Before starting the Activity, students will be guided with the safety instructions. Students will be invited to explain why the instruction is given. Therefore, students will have better understanding of the danger. That may prevent students from controllable dangers. Simple questions will be asked to check students' understanding with the hardware.

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5	**Activity – Computer Building** *(i) Preparation* Students will be grouped into 3 or 4 based on the mini-presentation groupings, which contain students with different abilities. Students will then be invited to take the hardware and tools they will need; no power cord will be given until checking if the computer hardware are properly connected in the (iii) Boot and Troubleshooting part.
65	*(ii) Hands-on* Students will be guided to install the components step by step. The process of installing a module will be demonstrated with the aid of visualiser. Then the students will follow the particular step demonstrated and the teacher will show them the next step after confirming all groups may follow.
10	*(iii) Boot and Troubleshooting* The computer students built will be checked to see if the hardware modules are connected properly. If not, students will be encouraged to find out 'something wrong' here by giving hints to foster high order thinking and develop their troubleshooting skills. Students will be invited to share what they found that it may cause the issue. Students will be invited to turn on the computer with the power cord given.
10	**Conclusion** Students will be asked to share and explain if they would like to try to build their own computer or purchase one form the computer manufacturers. After that, students will be invited to explain the usage of different components for checking their understanding for the lesson materials. To conclude the lesson, students will be given interesting questions for discussion. For example, why we still need HDD (traditional hard drives) when SSD (newer and with many benefits by comparing to HDD) is introduced; what is the purpose of a graphic card; what if we do not have a graphic card; if without a graphic card, the computer cannot display, then why there are monitor connector port (VGA) on the motherboard? These questions may be solved in the class by knowledgeable students, which is not expected. If the questions are not solved, students will be invited to search online after the lesson and share with their classmates in the next lesson.

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Students will be asked to complete the Exit Ticket online, appended in *Lesson Material – (3)*. After completing the Exit Ticket, students will be briefed with the Worksheet, appended in *Lesson Material – (4)*, which consolidate their knowledge and apply their knowledge recommending a hardware specification for their friend. The Worksheet may serve as an effective tool for assessing their learning outcomes for evaluating choices for computer components.

D. Lesson Materials

(1) Pre-lesson Worksheet

(2) Presentation Slides

(3) Exit Ticket

(4) Lesson Worksheet

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Lesson Material – (1) Pre-lesson Worksheet

Name [   ] Class [   ] No [   ] Date [   ]

Part A - System Units
Complete this part on your own.

1. Name all system units of a computer that you know and tell me their usage.

SYSTEM UNIT	USAGE

2. Have you ever built a personal computer? If so, please write down the specifications below.

YES / NO	SPECIFICATIONS

Part B - Group Mini-presentation
Complete this part with your group mates.

GROUP MEMBERS

Class	Class Number	Full Name

TOPIC

(The topic is assigned in the last lesson.)

| STEP 1   Online Searching

Features	
Latest Technologies	

Find three products of the assigned hardware topic

Models			
Brand			
Price			
Specifications (e.g. speed/ storage size...)			

| STEP 2   Group Presentation

INSTRUCTIONS

After finding the relevant information from the internet, you may start to prepare the presentation poster.

REMINDERS

1. Keep it short and precise, 1-minute is good, and 2-minute is long enough.
2. Feel free to create anything (e.g. poster, mind map, drawings…) you like for the presentation, as long as it is not larger than a piece of A3 paper.

BRAINSTORM AREA

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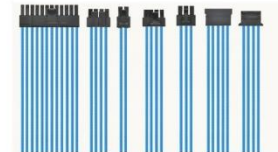
Class

Lesson Material – (2) Presentation Slides

System Unit of
Computer

Mini-presentation
Time for your work!

1. CPU
Central Processing Unit

- The main component of a computer
- Control all different component to work together

2. CPU Fans

CPU Fans keeps the CPU cool, it helps to:

- (i) maintain its performance
- (ii) protect the CPU from burning

3. Motherboard

- Connects all components, allowing the units to communicate

4. RAM
Random Access Memory

- RAM is the working memory for a computer
- It loses all data when there is no power

5. Storage Devices

- Where the computer stores most of its data
- HDD
  - Using disks and magnetising to store data
  - with a long history
- SSD
  - Using integrated circuits
  - Newly developed technology by comparison

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Lesson DESIGN THINKING

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Class

6. Power Supply Unit

- Converting AC power to DC power for the component

7. GPU (Graphics Processing Unit)

- Specially designed for heavy graphic load work.

BUILD A PERSONAL COMPUTER (PC)

Why DIY your own computer?

- Fully customise the parts base on your needs
- Save money by comparing to pre-built computers with similar hardware
- Upgrading single component without concerning the warranty
- Learn a new skill : D

Tools

Required

Screwdrivers

Optional

Scissors

Flashlight

Cable

Safety 101

Hands away from the connectors
(Stay away from anything is gold)

Keep yourself and the component away from electrostatic discharge
(Touch something metal and grounded)

Safety 101

Screws are fine when they are fine
(Keep the screws tighten with proper pressure)

Keep the hardware away from magnetic
(Use wooden table without magnetic tray)

Safety 101

Power the device only when it is ready
(Connect the power cord only when all works are completed)

Stay yourself safe by holding for a few minutes after unplugging
(Start working on the component 1-2 minutes after unplugging the power cord)

Let's Build

Course Materials *for use in*
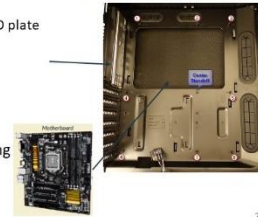**TLS3008, TLS6036, and TLS6065** *only*
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Lesson DESIGN THINKING

Class

Step 1: Open the Case

1. **Remove** the back screws
2. **Take** side cover off

Step 2: Mount Motherboard

1. **Screw** standoffs into the case
2. **Install** the I/O plate
3. **Fasten** the motherboard on top of the mounting standoffs
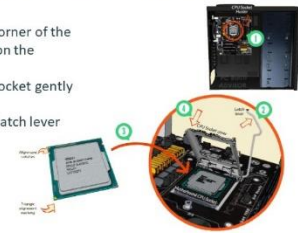
Step 3: Mount Processor (CPU)

1. **Lift up** the latch lever
2. **Open** the CPU socket cover

Step 3: Mount Processor (CPU)

3. **Hold** the CPU by *its sides*
4. **Line up** the triangle on the corner of the CPU to the triangle marked on the motherboard
5. **Place** it down into the CPU socket gently
6. **Close** the socket cover
7. **Lock** it by putting down the latch lever

Step 4: Install CPU cooler

1. **Apply** thermal paste to the back of CPU
2. **Fix** the CPU cooler in position
3. **Plug** the power cable attached to the cooler fan into the motherboard

Step 5: Install Power Supply (PSU)

1. **Mount** the PSU and fasten with screws to the case
2. **Plug** the largest cabling connector into the motherboard
3. **Plug** the 8-pin cable into the CPU

Step 6: Mount RAM

1. **Press to open** the clips of the RAM slots
2. **Line up** the notch on the RAM stick with the slot
3. **Press** it firmly down into the slot

Step 7: Install Graphics card

1. **Remove** the expansion slot covers from the rear of your case
2. **Slots** the graphics card into a PCI expansion slot
3. **Tighten** the screws of the slot graphics card
4. **Plug in** the power cable from the PSU into the graphics card (if needed)

Step 8: Mount storage drives

1. **Mount** drives in the case drive bays
2. **Connect** the drive to the motherboard
3. **Plug in** power cable to the drives from PSU

Step 9: Connect Front Panel Connectors

1. **Identify** the cabling from the front panel ports of the PC

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System Unit of Computer

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Exit Ticket
What do you think?

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Lesson Material – (3) Exit Ticket

Exit Ticket

Before you leave class today, answer the following questions.
* Required

1. Name *

    _____

2. Email

    _____

3. Name three things you learnt today *

    _____
    _____
    _____
    _____
    _____

4. Did you feel prepared for today's lesson? Why or why not? *

    _____
    _____
    _____
    _____
    _____

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Class

5. What would help make today's lesson more effective? *

    _____

    _____

    _____

    _____

    _____

6. Any questions in mind? *

    _____

    _____

    _____

    _____

    _____

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Class

Lesson Material – (4) Worksheet

Name [   ] Class [   ] No [   ] Date [   ]

Part A - Fill-in-the-blanks

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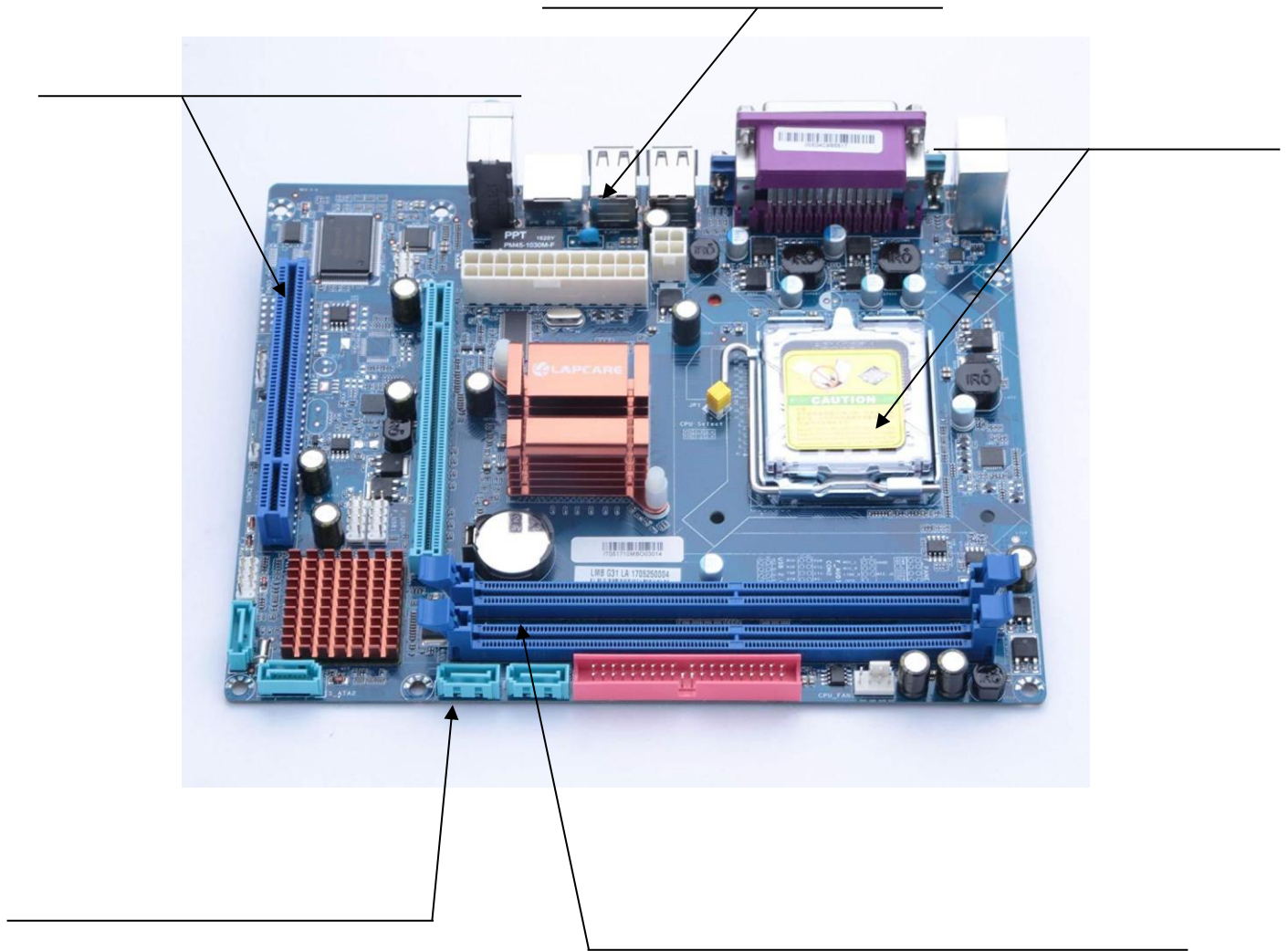
Part B - Multiple-choice
1. Which of the following are components inside a system unit of a computer?
   (1) Power supply
   (2) Motherboard
   (3) Scanner
   A. (1) and (2) only
   B. (1) and (3) only
   C. (2) and (3) only
   D. (1), (2) and (3)

2. A DVD is a/an _____.
   A. storage peripheral
   B. input peripheral
   C. output peripheral
   D. communication peripheral

3. Random Access Memory is a/an _____.
   A. storage peripheral
   B. input peripheral
   C. output peripheral
   D. communication peripheral

4. Solid State Drive is a/an _____.
   A. storage peripheral
   B. input peripheral
   C. output peripheral
   D. communication peripheral

Part C - Short Question
1. What are the differences between Solid-State Drive and Optical Hard drive?

_____

_____

_____

2. What is a CPU?

_____

_____

_____

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Lesson
DES GN
THINK NG

Ⓐ
Class

Part D - Scenarios

You are their friend, Tom. You have received a message from your friend. Please help for choosing the components addressing their needs.

Please help one of them (A or B) according to your student number. For odd, please work on A (Sam); then if even, please work on scenario B (Jacky).

A – Sam's Message	B – Message from Jacky
Hi Tom, it's Sam. I may need your help to build a pc for me. I am going to Secondary 4. There are many things to do on the computer. I only use it for making some documents and notes. It will be better if the cost is as low as possible. I can't afford it if it's so expensive. The budget is around 1k – 3k. Thank you!	Tom! I'm Jacky. I'm going to be a e-sporter soon so I want to build a TOP-class computer that can be able to play every game. Also, I need a big computer case with RGB lighting inside the case just as shown in the photo below. I have $15k - $25k budget can be spent on building a PC. Thanks

INSTRUCTIONS

Here is what you are going to do:
1. **Think** what kind of hardware suits them
2. **Search** information online or make use of the lesson worksheet
3. **Recommend** one product for them
4. **Tell** us what you are thinking behind

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YOUR SUGGESTION

	ITEM	PRICE
CPU		HK$
Motherboard		HK$
RAM		HK$
GPU		HK$
Storage		HK$
Power		HK$
Case		HK$
Accessories		HK$
		HK$
		HK$
	Total Price	HK$

Why did you choose this specification for your friends?