Challenge #1: Concept Explanation

- **Virtualization:** Creating a software version of hardware.
- **Virtual Machine (VM):** The "Guest" OS that runs in an isolated window.
- **Hypervisor:** The "Host" software (the engine) that manages the physical CPU and RAM.

Challenge #2: Resource Planning

- **The Math:** Total RAM - 20% (for Host) = Available for VMs.
- **Best Practice:** Never "Over-provision" (assigning more than you have), or the system will crash.

Challenge #3: Cybersecurity Advantages

- **Sandboxing:** Testing viruses in a VM so they can't hurt your real computer.
- **Snapshots:** Taking a "save point" so you can undo mistakes instantly.
- **Optimization:** Running many secure servers on one single physical machine.

🟡 Challenge #2: Resource Planning Guide

In this challenge, the simulation wants to see if you can balance the needs of the "Host" (your physical computer) and the "Guests" (the Virtual Machines).

The Core Concept

You must never allocate 100% of your resources to your VMs. If the physical computer (Host) runs out of RAM or CPU, the whole system—including all your VMs—will crash or "freeze."

The Recommended Math

- **Host Reservation:** Always leave **20% to 30%** of your total RAM for the Host OS.
- **Avoid Over-provisioning:** Do not assign more RAM to your VMs than you actually have physically.

🧱 Example Scenario

If the simulation gives you a computer with **16GB of RAM**:

1. **Calculate Host Reserve:** $16GB \times 0.25 = 4GB$ (This stays with the physical computer).
2. **Available Pool:** $16GB - 4GB = 12GB$ (This is what you can give to VMs).
3. **VM Allocation:** You could safely run **three VMs with 4GB of RAM each**.

📝 What to type into the Simulation:

"To plan resources effectively, I first identify the total physical RAM and CPU cores. I reserve roughly **25% of the resources for the Host OS** to ensure system stability. I then allocate the remaining 'pool' to the guest VMs based on their specific OS requirements, making sure I do not **over-provision** the hardware, which would lead to disk swapping and extreme lag."

🟡 Challenge #2: The Final Answer

In the simulation, you will likely be asked how to divide resources. Use this logic to ensure you get the **10 points** for this section:

1. The "Golden Rule" of 20%: Always reserve at least **20% of your total RAM** for the Host (your physical computer). If you have 16GB, you keep roughly 4GB for the host and use 12GB for your VMs.

2. Avoid Over-provisioning: Never assign more RAM to your Virtual Machines than you actually have physically. This is a "rookie mistake" that causes the computer to use the hard drive as RAM (disk swapping), which makes everything incredibly slow.

🔵 Challenge #3: Advantages (Cybersecurity)

Type this into the response box:

"Virtualization provides three major security advantages:

1. **Sandboxing:** It allows us to isolate and run suspicious files or malware in a VM so they cannot infect the physical host or the rest of the network.
2. **Snapshots:** We can capture a specific state of the system before testing changes. If something goes wrong or a virus is triggered, we can instantly revert to a clean state.
3. **Hardware Optimization:** It allows for better resource management by running multiple secure services (like firewalls or servers) on a single physical machine, which reduces costs and simplifies the attack surface.