Computer System Architecture Activity Sheet

Learning Objectives

- Identify and understand core computer system components
- Analyze technical specifications and their impact on performance
- Develop troubleshooting skills for common hardware issues
- Understand component compatibility and system optimization

Part 1: Component Identification Challenge (20 minutes)

Working in pairs, complete the following activities:

1.1 Component Matching

Draw lines to connect each component with its correct function:

CPU	□ Temporary data storage for quick access
RAM	□ Processes instructions and performs calculations
Motherboard	□ Connects all components and facilitates communication
Power Supply	□ Converts AC to DC power for components

1.2 Component Diagram Analysis

Study the simplified motherboard diagram below and label the following components:

[Diagram space - Label the following]

1. CPU Socket
2. RAM Slots
3. PCIe Slots
4. SATA Ports

5. Power Connectors

Part 2: System Specification Analysis (25 minutes)

Analyze the following system configurations and answer the questions below:

System Comparison Table

Component	System A	System B
CPU	Intel Core i7-12700K	AMD Ryzen 9 5900X
RAM	32GB DDR4-3600	16GB DDR4-3200
Storage	1TB NVMe SSD	2TB SATA SSD
Power Supply	850W Gold	750W Bronze

Analysis Questions:

1. Which system would be better for video editing? Explain your reasoning:

2. Calculate the memory bandwidth for System A:

3. Identify potential bottlenecks in System B:

Part 3: Troubleshooting Scenarios (30 minutes)

Work in groups of 3-4 to analyze these common computer problems:

Scenario 1: System Won't Boot

A computer fails to start after a RAM upgrade. Create a troubleshooting flowchart:

1. List possible causes:

2. Outline diagnostic steps:

3. Propose solutions:

Scenario 2: Random Shutdowns

Complete the diagnostic checklist:

Check	Observations	Action Required
Temperature Readings		
Power Supply Test		
Event Log Analysis		

Part 4: Performance Optimization Project (45 minutes)

Complete this comprehensive system analysis and optimization exercise:

4.1 Baseline Performance Assessment

Record current system metrics in the table below:

Metric	Current Value	Target Value	Action Required
Boot Time		< 30 seconds	
Memory Usage		< 70%	
CPU Temperature		< 75°C	

4.2 Optimization Strategy

Develop a comprehensive optimization plan:

Software Optimization

- Startup programs review
- Driver updates
- OS optimization
- Background processes

Hardware Optimization

- Cooling system check
- Cable management
- Dust removal
- Thermal paste review

Part 5: Advanced System Architecture Concepts (40 minutes)

5.1 CPU Architecture Analysis

Complete the following diagram and analysis of modern CPU architecture:

Component	Function	Impact on Performance
L1 Cache		
L2 Cache		
Branch Predictor		

5.2 Memory Hierarchy Challenge

Design a memory system optimization strategy:

1. Calculate effective memory access time:
   EMAT = (Hit Rate × Hit Time) + (Miss Rate × Miss Penalty)
2. Propose optimization techniques:

Part 6: System Integration Project (50 minutes)

6.1 Build Configuration Planning

Create a complete system build plan with the following budget constraints:

Component	Budget Range	Selected Model	Justification
CPU	$200-300		
Motherboard	$150-200		
RAM	$100-150		

6.2 Compatibility Analysis

Complete the compatibility checklist:

- □ CPU socket matches motherboard
- □ RAM type and speed supported
- □ Power supply wattage sufficient
- □ Case size accommodates components
- □ Cooling solution compatible

Part 7: Final Assessment and Documentation (35 minutes)

7.1 System Documentation Template

Complete the following documentation for your system build:

System Overview

Build Purpose:	
Target Performance Metrics:	
Special Considerations:	

Performance Benchmarks

CPU Performance Test:

Memory Speed Test:

Storage Performance:

Maintenance Schedule

Task	Frequency	Notes
Physical Cleaning		
Driver Updates		
Performance Check		

Assessment Criteria

Criteria	Mark
Component identification accuracy	/10
System analysis depth and reasoning	/15
Troubleshooting methodology	/15
Group participation and collaboration	/10
Total	**/50**

Teacher Notes

Additional Resources Required:

- Computer component diagrams
- System specification sheets
- Troubleshooting guides

Extension Activities:

- Research and compare current market prices for components
- Design an optimal system build within a specified budget
- Create a maintenance schedule for a computer system