CPI Calculation Explanation

Given:
- ALU CPI = 1.1
- Branch CPI = 3.0
- Cache hit rate = 60%
- Cache hit cost = 1 cycle
- Cache miss cost = 120 cycles
- Instruction mix:
* Loads: 22%
* Stores: 12%
* Branches/Jumps: 20%
* ALU ops: 46%

Step 1: Average memory access time:
avg_mem = 0.60×1 + 0.40×120
= 0.60 + 48
= 48.6 cycles

Step 2: CPI contributions:
- Loads: 0.22 × 48.6 = 10.692
- Stores: 0.12 × 48.6 = 5.832
- Branches: 0.20 × 3.0 = 0.600
- ALU ops: 0.46 × 1.1 = 0.506

Step 3: Total CPI:
CPI = 10.692 + 5.832 + 0.600 + 0.506
= 17.63 cycles per instruction