Teacher Answer Key

Case Study

1. AI training became dependent on GPUs because these chips are ideal for the parallel mathematical operations required to train large neural networks. Once scaling laws showed that bigger models trained on more data required more compute, demand for GPUs grew exponentially. Controlling access to advanced AI chips became equivalent to controlling AI capability itself, which is why governments began treating chip exports as a national security matter.

2. Sandra's company illustrates the hardware pillar of the AI boom — specifically, the concentration of AI chip manufacturing as a strategic resource. Her story shows that the demand for GPUs created supply chain constraints, geopolitical regulation, and enormous financial value for chip manufacturers. Without the hardware, neither the transformer architecture nor the vast training datasets would have translated into capable AI systems.

Multiple Choice

1. B
2. A
3. B

Matching

1-B, 2-C, 3-A, 4-E, 5-D

Fill-in-the-Blank

1) All, 2) terabytes, 3) NVIDIA

Short Answer (Sample Responses)

Q1: The three trends are the transformer architecture, vast internet training data, and GPU hardware. All three were necessary because the transformer provided the right design to take advantage of scale, internet data provided the scale of training material, and GPUs provided the computing power to actually run training on that data in a reasonable time. Having only architecture and data but no hardware would mean training would take years; having hardware and data but the old RNN architecture would mean performance would not improve efficiently with scale.

Q2: The internet contains an enormous volume of human writing across virtually every topic, making it a comprehensive record of human knowledge and language use. The advantage is breadth and scale — no other training source comes close. The

problem is that the internet also contains misinformation, bias, offensive content, and historically skewed perspectives, which AI models absorb and can reproduce, requiring extensive human review and filtering efforts to address.

Q3: Emergent capabilities are exciting because they suggest that scaling produces abilities beyond what anyone designed for — models become more capable in unexpected ways. They are concerning because if capabilities appear unpredictably, safety testing cannot fully anticipate what a system will be able to do, and capabilities associated with misuse (persuasion, deception, hacking assistance) could emerge without warning in larger models.