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Date: _____

Class: _____

Lynn Conway & The VLSI Revolution

Modern Computing Worksheet Series

If you are reading this on a smartphone or a laptop, you are holding the direct result of Lynn Conway's work. Born in 1938, Conway is an American computer scientist and electrical engineer. In the 1960s, she worked at IBM, where she invented a method called "generalized dynamic instruction handling" (also known as out-of-order execution). This breakthrough allowed computer processors to perform multiple tasks much faster by calculating them out of their original sequence, a technique still used in almost all high-performance computer chips today.

However, despite her brilliant work, IBM fired her in 1968. Lynn Conway is a transgender woman, and when she informed the company of her intention to transition, they dismissed her. Faced with losing her career, she completed her transition and started all over again in "stealth" mode—taking a lower-level contract programming job under her new name and keeping her past a secret. Through sheer talent and resilience, she quickly worked her way back up to the top of the tech industry, eventually joining the prestigious research lab Xerox PARC.

It was at Xerox PARC in the late 1970s that Conway made her most famous contribution. At the time, designing computer chips was incredibly tedious. Engineers drew circuits by hand using colored pencils and tape. As chips became more complex, this method became impossible. Conway, alongside researcher Carver Mead, created a new set of standardized design rules called VLSI (Very Large Scale Integration). Their rules allowed engineers to write code that would tell a computer how to design the physical chip for them.

In 1979, Conway co-authored the textbook *Introduction to VLSI Systems*. It became a massive hit, sparking a revolution in how universities taught computer science and how Silicon Valley manufactured technology. Because of VLSI, the number of microscopic transistors that could be packed onto a single microchip skyrocketed from a few thousand to billions, making the modern tech boom possible. Later in life, after a long career in academia, Conway came out publicly and became a prominent advocate for transgender rights in STEM. In 2020, over 50 years after firing her, IBM formally apologized to Conway for their actions and recognized her incredible legacy.

PART 1: MULTIPLE CHOICE

Circle the letter of the best answer.

1. What did Lynn Conway invent while working at IBM in the 1960s?

- A. The first electronic screen.
- B. Out-of-order execution (generalized dynamic instruction handling) to make processors faster.
- C. The computer mouse and graphical user interface.
- D. The "stored-program" concept of computer memory.

2. What does VLSI stand for in the context of computer chips?

- A. Very Large Scale Integration
- B. Virtual Logic System Interface
- C. Visual Layout for Silicon Inventions
- D. Vectorized Local Storage Index

3. How did the Mead-Conway VLSI design rules change the way computer chips were made?

- A. It required engineers to only use copper wiring instead of gold.
- B. It made chips significantly larger so they wouldn't overheat.
- C. It allowed engineers to use computers and code to design chips, rather than drawing them by hand.
- D. It completely eliminated the need for transistors on a microchip.

PART 2: SHORT ANSWER

Write your answers in complete sentences based on the reading passage.

4. Describe the major setback Lynn Conway faced in 1968. How did she rebuild her career afterward?

5. Why was the traditional method of designing computer chips in the 1970s becoming impossible as technology advanced?

PART 3: CRITICAL THINKING

6. Lynn Conway had to work in "stealth" for many years, keeping her past identity a secret out of fear of discrimination, before she could finally become an advocate. Why is it important for workplaces and the STEM community to be inclusive today? What is lost when brilliant people are forced out of their fields because of prejudice?
