NAME _____

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HISPANIC HERITAGE MONTH

Luis von Ahn

CAPTCHA, reCAPTCHA, and the Idea of Human Computation

Ten Seconds, Two Hundred Million Times a Day

Luis von Ahn was born in Guatemala City in 1978. His mother, a physician, bought him a computer when he was eight. He came to the United States for university and earned a PhD in computer science at Carnegie Mellon, where he later became a professor.

Around 2000, von Ahn and colleagues developed the **CAPTCHA**: a challenge that separates humans from automated programs, or **bots**, by exploiting a gap between what people find easy and what software finds hard. The distorted-text CAPTCHA became standard equipment across the web, blocking bots from mass-registering fake accounts.

Von Ahn then made a second, sharper observation. Roughly 200 million CAPTCHAs were being solved every day, each taking about ten seconds. That was an enormous amount of human effort producing nothing but a gate check. His answer was **reCAPTCHA**: show the user one word the computer already knew and one word that had defeated **OCR** software while scanning old books and newspapers. The known word verified the human; the unknown word got transcribed for free. Google acquired reCAPTCHA in 2009.

He calls this idea **human computation** — designing systems where routine human effort, aggregated at enormous scale, solves problems computers cannot. In 2011 he applied it again by co-founding **Duolingo** with Severin Hacker, building a free language-learning platform now used by hundreds of millions of people.

Part 1 · Reading Comprehension

1. What gap between humans and computers does a CAPTCHA exploit?

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2. Explain the two words in an original reCAPTCHA and the job each one did.

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3. Define "human computation" in your own words and give an example from the passage.

4. What do reCAPTCHA and Duolingo have in common as ideas?

Part 2 · Critical Thinking

CAPTCHAs work because computers are bad at certain tasks. As artificial intelligence gets better at recognizing images and text, what happens to the CAPTCHA? Propose what a website could use instead.

Part 3 · STEM Challenge

The Scale of Ten Seconds

Von Ahn's insight was about scale: a task too small to notice becomes enormous when millions of people repeat it. Assume 200 million CAPTCHAs solved per day at 10 seconds each. Show your work.

1. How many total seconds of human effort is that per day?
2. Convert that to hours.
3. A full-time worker works about 2,000 hours per year. How many workers' worth of a year is spent on CAPTCHAs in a single day?
4. In one sentence, explain why this calculation is the whole argument for reCAPTCHA.