

English I RI 1-3

Stop Wondering, Start Experimenting

- 1 Many of the greatest scientific discoveries of our time have been accidents. Take radioactivity. Physicist Henri Becquerel simply left a uranium rock in a drawer with some photographic paper. Oops! When he returned, he found that the uranium had left a mark on the paper just as it would if the sun had exposed the paper. Becquerel asked himself, “What power could have caused this?” He postulated radioactivity prompted by this accident. Later, Nobel Prize winner Marie Curie carefully separated the element radium. She worked slowly and carefully to study its properties. Curie’s thorough work might be closer to what we expect from scientists. She performed slow steady research toward a rigorous proof. She did not simply take advantage of a happy accident. Still, Becquerel’s accident contributed profoundly to physics. Moreover, the discovery of uranium is just one of many happy accidents in science. The discovery of the x-ray, the microwave, penicillin and dynamite all resulted from unpredictable accidents.
- 2 These fortuitous accidents should tell us something about how scientific research proceeds. Science’s progress cannot be accurately predicted. No armchair thinker could have imagined these discoveries. No one could have envisioned the effects.
- 3 Nonetheless, many bloggers, journalists, novelists, researchers, and erstwhile scientists waste time attempting to predict the future of science. The Sunday *New York Times* contains dozens of articles speculating about the direction technology will take or the next greatest domain of research. One week, all commentators focus on wearable digital glasses and claim that everyone will have a pair by next year. The next week, *en masse* these writers decide instead that the future of technology depends on the invention of nanotechnology and bioengineering. The following year, everyone has forgotten these claims in favor of the latest suggestion, and so and so forth, *ad nauseam*. Who will be right? No one writing today can say; only future thinkers can say for sure.
- 4 I would argue that those who truly intend to better the world would spend their time better not writing and wondering but in a laboratory testing hypotheses with experiments. Now, I am not against “wondering.” Anyone who intends to be a scientist or inventor must set out with a healthy attitude of wonder, awe, and interest in the world around her. As Plato said, wisdom begins in wonder. Plato, however, did not say that wonder is *enough* for wisdom. To truly acquire understanding of the world, one must head into the laboratory or out into the field and test a claim. The results might be messy or unpredictable but they represent the real world.
- 5 There may of course be a time and place for reflection and speculation: in fiction or magazines. Such fiction can be amusing. Science fiction from the past is often funny. In cartoons, people fly around suburbs in personal jets and eat food magically prepared by robots. People imagined robots would inhabit every American house. In futuristic novels, America often has achieved an ordered utopia or, alternatively, has descended into a lawless

chaos. I cannot claim to have read all of these books, but I am quite sure that none of these predictive fictions have portrayed the actual slow, unexpected turns in real history.

- 6 While a person might enjoy reading science fiction as a pastime, we cannot turn to such futuristic visions for any guide to action. We should not confuse this speculation with actual scientific hypothesis. These *soi-disant*, self-styled “predictors” of technology who write elaborate descriptions of humanity’s possible progress have no real evidence for their claims. A hypothesis must be tested and supported with data. Many, if not most, predictions are wrong. We just don’t hear about those myriad incorrect guesses again. Only the rare correct guesses get attention. That doesn’t mean that making predictions about the future serves a useful function in society, but only shows how useless most predictions in fact are.

1. Read this sentence from Paragraph 2.

No armchair thinker could have imagined these discoveries.

What does the sentence MOST imply about people who make predictions?

- A. They are limited by their lack of creativity.
 - B. They are highly educated and experienced in science.
 - C. They are disconnected from the work required to be a scientist.
 - D. They are impressed by the speed with which technology is developed.
- 2. According to the author, whose opinion should be trusted about the value of new technology?**
- A. future scientists and researchers
 - B. ancient thinkers and philosophers
 - C. contemporary writers and reporters
 - D. past science fiction authors and artists

- 3. Which sentence BEST describes how Henri Becquerel and Marie Curie worked together to contribute to physics?**
- A.** Becquerel inspired Curie to begin experimenting with uranium and other radioactive elements.
 - B.** Curie gained fame and respect for her cooperation with Becquerel in his study of radioactivity.
 - C.** Curie used deliberate scientific methods to expand on Becquerel’s accidental discovery of radioactivity.
 - D.** Becquerel noticed that uranium displayed radioactive properties and invited Curie to help him study the phenomenon.
- 4. Which detail is MOST important to include in a summary of the passage?**
- A.** the popularity of the field of nanotechnology among science writers
 - B.** the abundance of important discoveries made by accident
 - C.** the photographic properties of radioactive elements
 - D.** the roles of robots as imagined in science fiction
- 5. Which idea is MOST fully developed in the passage?**
- A.** Science fiction offers many examples of inaccurate predictions.
 - B.** Journalists and researchers often have a limited understanding of technology.
 - C.** Many important discoveries required the combined effort of several scientists.
 - D.** Attempting to predict the future is of less value than practical application of ideas.

6. What is the MAIN idea of the last paragraph?

- A. People are fascinated by descriptions of futuristic technology.
- B. People with a serious view of science should not read science fiction.
- C. Predictions that prove to be accurate receive a large amount of attention.
- D. Predictions are useless when they are not supported by scientific evidence.

7. According to the author, what is the relationship between wondering and experimenting?

- A. Wondering is the foundation of creativity, so it can replace experimentation when necessary.
- B. Wondering is the first step toward discovery, so it should be followed by active experimentation.
- C. Wondering distracts scientists from their experiments, so they should avoid it whenever possible.
- D. Wondering generates unpredictable results, so scientists should be cautious with it while conducting experiments.

8. According to the author, how do MOST inventors create new technology?

- A. by conducting tests
- B. by making guesses
- C. by writing articles
- D. by reading fiction

- 9.** The speaker believes that those who attempt to predict the future are
- A.** only hoping that they will stumble upon a discovery.
 - B.** mostly those who intend to profit from the predictions.
 - C.** helping to secure a future.
 - D.** wasting their time.
- 10.** With which of the following statements would the speaker likely agree?
- A.** Fiction authors and scientists should work together to shape the future.
 - B.** The best place to make meaningful discoveries is in a laboratory.
 - C.** Predictions and reflections are critical components of proving theories.
 - D.** Much of what we know of our world today is a direct result of happy accidents.