Name:

Date:

Period:

Annotations: As you read make notes on the text by doing the following:

* **Circle** any words you do not know- write the definition in the margin
* **Underline** any section which might be pertinent (applicable) to your research paper- write yourself a reminder note in the margins so you do not lose that brilliant thought!
* **Box** sections in which you see a clear connection with the text- write a short explanatory note in the margins

Points:

Annotations: \_\_\_/5

Response: \_\_\_/5

WHAT IS THE BRAIN INITIATIVE?

The Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative is part of a new Presidential focus aimed at revolutionizing our understanding of the human brain. By accelerating the development and application of innovative technologies, researchers will be able to produce a revolutionary new dynamic picture of the brain that, for the first time, shows how individual cells and complex neural circuits interact in both time and space. Long desired by researchers seeking new ways to treat, cure, and even prevent brain disorders, this picture will fill major gaps in our current knowledge and provide unprecedented opportunities for exploring exactly how the brain enables the human body to record, process, utilize, store, and retrieve vast quantities of information, all at the speed of thought.

Why Is The BRAIN Initiative Needed?

**Source:** [The Human Connectome Project](http://neuroscienceblueprint.nih.gov/connectome/index.htm)

With nearly 100 billion neurons and 100 trillion connections, the human brain remains one of the greatest mysteries in science and one of the greatest challenges in medicine. Neurological and psychiatric disorders, such as Alzheimer’s disease, Parkinson’s disease, autism, epilepsy, schizophrenia, depression, and traumatic brain injury, exact a tremendous toll on individuals, families, and society. Despite the many advances in neuroscience in recent years, the underlying causes of most of neurological and psychiatric conditions remain largely unknown, due to the vast complexity of the human brain. If we are ever to develop effective ways of helping people suffering from these devastating conditions, researchers will first need a more complete arsenal of tools and information for understanding how the brain functions both in health and disease.

WHY IS NOW THE RIGHT TIME FOR THE BRAIN INITIATIVE?

A focus of the initial years of the BRAIN Initiative is the development of next-generation tools for exploring how dynamic patterns of neural activity in the brain control thoughts, feelings and movements.
**Source:**NIH

In the last decade alone, scientists have made a number of landmark discoveries that now create the opportunity to unlock the mysteries of the brain. We have witnessed the sequencing of the human genome, the development of new tools for mapping neuronal connections, the increasing resolution of imaging technologies, and the explosion of nanoscience. These discoveries have yielded unprecedented opportunities for integration across scientific fields. For instance, by combining advanced genetic and optical techniques, scientists can now use pulses of light in animal models to determine how specific cell activities within the brain affect behavior. What’s more, through the integration of neuroscience and physics, researchers can now use high-resolution imaging technologies to observe how the brain is structurally and functionally connected in living humans.

While these technological innovations have contributed substantially to our expanding knowledge of the brain, significant breakthroughs in how we treat neurological and psychiatric disease will require a new generation of tools to enable researchers to record signals from brain cells in much greater numbers and at even faster speeds. This cannot currently be achieved, but great promise for developing such technologies lies at the intersections of nanoscience, imaging, engineering, informatics, and other rapidly emerging fields of science.

How Will The BRAIN Initiative Work At NIH?

Image of the dentate gyrus of the mouse hippocampus using Brainbow transgenes. This technology, developed by researchers at Harvard University, uses genetic methods to label individual nerve cells in different colors to identify and track axons and dendrites over long distances. Credit: Joshua Sanes, Ph.D., Harvard University Medical School External Web Site Policy

Given the ambitious scope of this pioneering endeavor, it was vital that planning be informed by a wide range of expertise and experience. Therefore, NIH established a high level working group of the Advisory Committee to the NIH Director (ACD) to help shape this new initiative. This working group, co-chaired by Dr. Cornelia “Cori” Bargmann (The Rockefeller University) and Dr. William Newsome (Stanford University) sought broad input from the scientific community, patient advocates, and the general public. Their report, released in June 2014 and enthusiastically endorsed by the ACD, articulated the scientific goals of the BRAIN Initiative and developed a multi-year scientific plan for achieving these goals, including timetables, milestones, and cost estimates.

Of course, a goal this audacious will require ideas from the best scientists and engineers across many diverse disciplines and sectors. Therefore, NIH is working in close collaboration with other government agencies, including the Defense Advanced Research Projects Agency (DARPA), National Science Foundation (NSF), the U.S. Food and Drug Administration (FDA) and Intelligence Advanced Research Projects Activity (IARPA). Private partners are also committed to ensuring success through investment in the BRAIN Initiative.

Five years ago a project such as this would have been considered impossible. Five years from now will be too late. While the goals are profoundly ambitious, the time is right to inspire a new generation of neuroscientists to undertake the most groundbreaking approach ever contemplated to understanding how the brain works, and how disease occurs.

Response: *Brave New World* warns of the dangers of giving the state control over new and powerful technologies. One illustration of this theme is the rigid control of reproduction through technological and medical intervention, including the surgical removal of ovaries, the Bokanovsky Process, and hypnopaedic conditioning. Yet, many researchers find it necessary to gain support and funding from the government to continue experiments and make major advances for the good of mankind. Do you believe governments should be funding scientific projects such as this one researching the human brain? Why or why not? Do you think the author of Brave New World would agree with you? Use evidence from the text to support your inferences.

To answer the question make a connection between this article and the chapters read thus far in a clear and concise 3-5 sentence answer.

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