Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

AP Biology Mr. Collea

**Nova: Cracking the Code of Life**

**(Due Tuesday, January 17th, 2017)**

***Directions****: Please answer all questions in the space provided. The questions should be in movie order.*

**1.** What percentage of our genes do we have in common with a banana? \_\_\_\_\_\_\_\_\_\_

**2.** What does DNA look like to the naked eye?

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**3.** What are the 4 chemicals that make up the ‘steps’ in the DNA ladder?

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**4.** How many ‘steps’ are in the human genome?

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***5.*** Humans have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ as many genes as a fruit fly.

**6.** What percentage of the DNA is identical in all human babies? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**7.** What is the Human Genome Project?

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**8.** How long did they think it would take to complete the human genome? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**9.** How long did it take to find the gene that causes cystic fibrosis? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**10.** What percentage of DNA is active and important in our cells? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**11.** What disease does Hayden have? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**12.** What is Tay-Sachs disease and how does it affect a child’s development?

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**13.** How big is the mistake in the DNA code that causes Tay-Sachs? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**14.** What molecule/protein does the mistake affect? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**15.** Why don’t Hayden’s parents have the disease?

 *(You may want to set up a Punnett Square to help explain your answer.)*

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**16.** What were the odds of Hayden inheriting this disease?

 *(You may want to set up a Punnett Square to help explain your answer.)*

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**17.** What are the symptoms of Tay Sachs and what happens to someone with Tay Sachs disease?

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**18.** Blythe is a carrier for Tay-Sachs. What does this mean?

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**19.** How do scientists hope to use the human genome project as an early warning system?

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**20.** How have computers helped scientists code the human genome?

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**21.** What process does Venter’s lab do that speeds up the process of mapping human DNA?

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**22.** What influenced Venter’s decision to map the human genome?

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**23.** Venter’s group said that they could sequence the whole human genome in \_\_\_\_\_\_\_\_ years, even though the government planned to do it in \_\_\_\_\_\_\_ years.

**24.** How did Venter’s announcement affect how the government’s lab was sequencing human DNA?

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**25.** Whose genes were used for the human genome project?

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**26.** How does Dr. Lander compare human DNA to the similarity of chimpanzee DNA?

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**27.** Why are humans and chimpanzees genetic makeup so similar to each other?

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**28.** Are humans MORE or LESS closely related to other humans than chimps are to other chimps? \_\_\_\_\_\_\_

**29.** **EVOLUTION** – Explain why humans are so genetically similar?

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**30.** What percentage of human DNA is similar to a Banana? \_\_\_\_\_\_\_\_\_\_. How can this be?

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**31.** What percentage of the ubiquitin gene is the same in humans and yeast? \_\_\_\_\_\_\_\_\_\_

**32.** What is ubiquitin?

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**33.** How are genes being turned into private property?

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**34.** How long does it take a patent office to process an application? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**35.** How many applications are waiting to be processed? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**36.** Why do research companies want patents?

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**37.** What are the advantages and disadvantages of patenting genes?

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| **Advantages** | **Disadvantages** |
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**38.** What disease does 2 month old Riley have? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**39.** What organ does this disease affect the most? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**40.** What does cystic fibrosis, or CF, do?

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**41.** What year was the gene for CF discovered? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**42.** “Genes create \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and proteins create \_\_\_\_\_\_\_.”

**43.** How does the ***SHAPE*** of a protein define what it can do?

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**44.** How many base pairs (letters) are wrong with Riley’s DNA? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**45.** What does the healthy version of the cell membrane protein do?

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**46.** What happens if the CF protein is not the right shape?

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**47.** How is Riley’s CF treated?

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**48.** How do scientists hope to help Riley?

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**49.** Why are scientists so interested in Tony’s CF case?

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**50.** What do they think might be helping Tony?

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**51.** What do genes DO?

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**52.** What is the Human Genome (*review*)?

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**53.** What is the Human Proteome?

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**54.** How many genes do people have? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**55.** Although we have only twice as many genes as a fruit fly, we are more than twice as complex.

 How does the proteome explain this?

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**56.** What did the scientists at Celera do to blow off steam?

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**57.** Is competition a good or bad thing for business? Explain.

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**58.** How do scientists find a specific gene?

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**59.** Why is Iceland the perfect place to look for genes causing disease?

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**60.** What was Decodes Genetics first project?

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**61.** How many of Mrs. Magnusdottir’s siblings developed osteoarthritis? \_\_\_\_\_\_\_\_\_\_\_\_\_

**62.** What did deCode have to get from the Republic of Iceland to do their research?

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**63.** Should your DNA be public or private? Why?

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**64.** What disease did Melanie have? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**65.** What are the names of the 2 genes linked to breast cancer? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**66.** Name and describe in detail the type of mutation that causes breast cancer?

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**67.** What percentage of women who have the breast cancer genes actually develop breast cancer? \_\_\_\_\_\_\_\_

**68.** What did the Doctor in GATTACA fix in the unborn child that made the parents uneasy?

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**69.** When was the human genome project completed? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**70.** What does it mean that the human genome is ‘lumpy’?

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**71.** What is the remarkable thing about the Human Genome?

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**72.** What percent of the 3 billion letters that make up the Human Genome actually genes? \_\_\_\_\_\_\_\_\_\_

**73.** What is 50% of the rest of the genome?

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**Craig Venter**