

AP Biology Summer Assignment 2017-2018

North Gwinnett High School

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If you have any questions/problems concerning the summer assignments, please contact Coach Johnson.

Books required for this year:

1. Napoleon's Buttons: Seventeen Molecules that Changed History, by Penny LeCouteur and Jay Burreson
2. Genome: The Autobiography of a Species in 23 Chapters (P.S.) by Matt Ridley
3. Your Inner Fish, A Journey into the 3.5 Billion-year History of the Human Body, by Neil Shubin.

You may want to order all three books at the same time. All 3 books usually sell for less than \$10 each on Amazon.com. Or you can find them at many local bookstores.

Summer Assignment #1

Napoleon's Buttons: Seventeen Molecules that Changed History:

Read and Study = read, highlight, outline, take notes, etc.... so that you are prepared to correctly answer the questions. You will have a test on these questions from Napoleon's Buttons: Seventeen Molecules that Changed History when you return to school in the fall.

Summer Assignment #2

Genome: The Autobiography of a Species in 23 Chapters (P.S.)

Read and Study = read, highlight, outline, take notes, etc.... so that you are prepared to correctly answer the questions. You will have a test on these questions from Genome: The Autobiography of a Species in 23 Chapters towards the end of fall semester.

Summer Assignment #3

Your Inner Fish

Read and Study = read, highlight, outline, take notes, etc.... so that you are prepared to correctly answer the questions. You will have a test on these questions from Your Inner Fish, A Journey into the 3.5 Billion-year History of the Human Body in second semester.

All reading questions need to be completed and turned in at orientation on Thursday, August 3rd or the first day of school Monday, August 7th.

You will be given back the reading questions to study for a test on each book. The dates of those tests will be given to you once school starts.

If you have any questions or problems, please e-mail Coach Johnson (Matthew_Johnson@gwinnett.k12.ga.us).

Napoleon's Buttons: 17 Molecules that Changed History

Introduction

1. What metal might have been the downfall of Napoleon's army?
2. What city was deemed less valuable than the spice nutmeg?
3. What is the belief that there is something mystical about compounds derived from plants and animals?
4. What element defines a compound as organic?
5. What about a compound determines what it does (its function)?
6. Which atom is represented by the intersection of lines in the simplest structural diagrams/formulas?
7. What does an aromatic compound contain?

Chapter 1

8. What city had the world's spice kings?
9. Controlling the trade of what molecule began the Portuguese empire?
10. Why do we feel the "heat" of piperine? Its _____ fits onto a protein of our pain nerve endings.
11. What relatively insignificant compound was responsible for beginning today's complex economic structure of the world stock markets?
12. Who was the first person that was credited with circumnavigating the world, who was really just trying to get faster access to spices?
13. What disease, did Europeans believe they were protected from by wearing nutmeg around their neck?
14. What is the common drug name of 3, 4-methylenedioxy-N-methylamphetamine (MDMA), derived from safrole of the Sassafras tree?

Chapter 2

15. What is Ascorbic Acid known as?
16. What disease was a result of a deficiency of ascorbic acid?
17. List some (4 or 5) of the things Cook accomplished.
18. What element was originally thought to be in all vitamins?
19. Which animals can synthesize ascorbic acid in their liver?
20. Ascorbic acid is vital in the production of what protein?
21. What lethal toxin does Vitamin C help prevent as a preservative?

Chapter 3

22. What amount did the per capita (per person) consumption of sugar reach in the 1900s?
23. What percentage of African slaves labored on sugar plantations in the new world?
24. What molecule is removed when one glucose molecule is joined to one fructose molecule to form a sucrose molecule?
25. Which of the following (Fructose, Galactose, Glucose and/or Sucrose) is not an isomer of the others?
26. Which artificial sweetener replaces hydroxyl groups (-OH) with chlorine atoms to keep the body from metabolizing it?
27. What was the first artificial sweetener?

Chapter 4

28. What greatly impacted the cotton industry in England?
29. What greatly impacted the cotton industry in the United States?
30. What is a glucose molecule with the hydroxyl (-OH) at the first carbon above the ring?
31. What is a glucose molecule with the hydroxyl (-OH) at the first carbon below the ring?
32. Which organism cannot digest and absorb cellulose?
33. Which of the following (Appendix, Cecum, Eating their feces and/or Four-chambered stomach) is not an adaptation that allows animals to digest and absorb cellulose?
34. What kind of linkages do storage polysaccharides have?
35. What kind of linkages do structural polysaccharides have?
36. Which storage polysaccharide can provide more quick energy because it is branched?
37. Which modified cellulose product was used in the motion pictures?
38. Which of the following (Carbon – C, Salt Peter/Potassium Nitrate - KNO_3 , Oxygen O_2 , and/or Sulfur – S) is not a component of gunpowder?

Chapter 5

39. What propels the projectiles when using gunpowder?
40. How are explosive reactions classified because they give off heat?
41. List the chemicals of this chapter in order from least to most explosive.
42. How can the explosive nitroglycerine be useful in the human body?
43. Who invented dynamite?
44. Which explosive became the explosive of choice for heavy artillery during World War I?
45. What chemical, important as a fertilizer in food production, is also needed for producing Nitric Acid which is necessary for making explosives?

Chapter 6

46. Where did the silk industry get started?
47. What are the most common amino acids making up silk?
48. What is the name of the bond holding adjacent amino acids together?
49. What type of bonds hold adjacent parallel chains of silk together?
50. What is the level of protein structure for Pleated Sheets (Primary, Secondary, Tertiary or Quarternary)?

Chapter 7

51. Whose paper on Germ Theory influenced what Lister did as a doctor?
52. What naturally occurring phenol compound has hallucinogenic properties and is considered illegal?
53. Who initiated the Age of Plastics?
54. What animals were saved by making billiard balls out of Bakelite?
55. What food flavoring agent do we get from lignin in wood?

Chapter 8

56. Rubber is a polymer of what molecule (C_5H_8)?
57. The _____ form occurs when similar atoms are on the same side of the double bond, and the _____ form occurs when similar atoms are not on the same side of the double bond.
58. What sport benefitted from the trans- isoprene polymers in the 1840s?
59. What process forms disulfur cross-links in rubber?
60. The production of large quantities of rubber by the U.S. in World War II has been described as the second greatest feat of engineering of the 20th century. What is considered the first?

Chapter 9

61. What color was reserved for kings or emperors?
62. What color does the molecule Alizarin produce?
63. What color does the molecule Indigo produce?
64. What color does the molecule Saffron produce?
65. What color does the molecule Tyrian produce?
66. Mauve dye was discovered while trying to chemically synthesize quinine to resist what disease?

Chapter 10

67. Who successfully demonstrated producing immunity to smallpox?
68. What form of Salicylic Acid turned out to be effective without some of the negative side effects?
69. How did they treat Syphilis for hundreds of years?
70. What do Sulfa drugs not allow bacteria to produce?
71. What unstable structure allows penicillin to work?

Chapter 11

72. How many fused rings are found in steroids?
73. What was the first sex hormone isolated?
74. What hormone suppresses ovulation during pregnancy?
75. What chemical was synthesized as a hormone treatment to support pregnancy or to relieve menstrual irregularity, but became “the pill.”
76. Has there ever been an attempt to develop an oral contraceptive for men even though they don't have a hormone cycle?

Chapter 12

77. What percentage of accused witches were women, and their accusers were just as likely also to be women as men?
78. What were many of the women accused of witchcraft called because of their skills in the use of local plants to cure disease and provide relief from pain?
79. What animal, after the cat, is most commonly attributed to witchcraft?
80. Alkaloids have one or more _____ atoms, usually as a part of a ring of carbon atoms.
81. What was considered to be a wonder drug when it was isolated in the 1880s?
82. What organism produced the alkaloid that caused ergotism, which may have been responsible for “witchcraft” without actually effecting the accused?
83. What popular drug was the result of the 25th derivative of lysergic acid, by Albert Hofmann?

Chapter 13

84. In what century did opium shift from being used as a medicinal herb to being used to achieve a dream-like state for enhancing creativity?
85. What colony, recently given back to China, was obtained by Britain after the 1st Opium War?
86. What narcotic was made from acetylating morphine?
87. What chemical helps authorities find heroin manufacturers?
88. What ruler said tobacco smoking was “dangerous to the lungs” in 1604?
89. Nicotine initially acts as a _____ but in large doses becomes a _____.
90. Which chemical is a natural insecticide?
91. Does Caffeine keep you awake? Explain.
92. What compound in chocolate is responsible for the “feel good” appeal that is associated with THC in marijuana?
93. Which Alkaloid is encouraged in children and has not been shown to have any significant medical side effects?
94. What is the usual source of the following alkaloids? Caffeine, Theophylline, Theobromine

Chapter 14

95. How long has the olive tree been grown for fruit?
96. What molecule is found in the olive leaves that helped reduce fevers?
97. Who are given wreaths of olive leaves for victories?
98. Why does the olive tree not grow inland?
99. What are fats and oils called (because they contain a glycerol and three fatty acid)?
100. How are triglycerides formed?
101. What is a fatty acid that contains carbon to carbon double bonds?
102. How are trans-fats formed by humans?
103. Was the decline of Greece due to the olive oil trade?
104. Was bathing in Europe considered dangerous, unfashionable and sinful?
105. Soap molecules clean because one end of the molecule is _____ and one end of the molecule is _____.

Chapter 15

106. What was salt known as due to its value?
107. Which city is cited as being one of the first examples of the impact of human industrial activity on the environment?
108. What fish was driven to near extinction because salt was used to preserve it, allowing fisherman to travel greater distances to catch it?
109. What type of charge do electrons have?
110. What is the difference in charge (due to salt) of the cytoplasm compared to outside the cell call?
111. What is the process for separating salt (sodium from chlorine) using an electrical current?

Chapter 16

112. What year marked the era of refrigeration?
113. Which ship completed the first successful voyage of a refrigerator ship?
114. Why don't ammonia, ether, methyl chloride or sulfur dioxide make good refrigerants?
115. When were refrigerators considered a standard home appliance in the developed world?
116. How many tons of CFCs were being produced annually by the early 1970s?
117. Where is the ozone layer found?
118. How many ozone molecules can one chlorine atom reaching the upper atmosphere via a CFC molecule destroy?
119. When was the manufacturing of PCBs in the United States outlawed?
120. Why were the "bug bombs" used in World War II a double blow to the environment?
121. DDT and its breakdown products being fat soluble led to them working their way up the food chain/web. What is the movement of molecules up the food chain/web into greater quantities at the top of the chain/web known as?
122. What does DDT do to hurt birds of prey?
123. What is considered to be the most lethal man-made compound?

Chapter 17

124. How many people die each year from malaria?
125. What is the most lethal malaria species that infects humans?
126. What is in the bark of the Chinchona trees that makes it counteract malaria?
127. When was quinine finally isolated and purified?
128. What chemical was found to interfere with the nerve control process of insects but not other animals?
129. In what year did the World Health Organization (WHO) begin a DDT campaign to eliminate malaria world wide?
130. What genetic disorder is the natural defense to malaria if you are a "carrier" but don't actually have the disorder?
131. What is the difference in amino acids from a hemoglobin molecule with that of one that has sickle cell?
132. Changing one amino acid, Glutamic Acid to Valine, results in sickle cell. Glutamic Acid is an acidic or electrically charged amino acid. What is Valine?

Genome: The Autobiography of a Species in 23 Chapters (P.S.)

Introduction:

1. The human body contains approximately _____ cells, most of which are less than a tenth of a millimeter across.
2. The copying of DNA is known as _____.
3. Making RNA from DNA is known as _____.
4. Making proteins from RNA is known as _____.
5. Almost everything in the body, from hair to hormones, is either made of _____ or made by them.
6. _____ are mistakes when genes are replicated.

Chapter 1

7. What chemical links the worlds of DNA and protein?
8. Which probably came into being first, DNA or RNA?
9. Who was the first creature to have its “genetic recipe” made of DNA?
10. The genetic code is the same in every creature except in some _____.

Chapter 2

11. Prior to 1955, scientists believed humans had how many nuclear chromosomes?
12. Humans normally have how many nuclear chromosomes?
13. Which ape is closest to humans genetically, sharing 98% of our genetic code?
14. What is the process by which genes change their sequence?
15. Genes are recipes for anatomy, but they can also be recipes for _____.

Chapter 3

16. Francis Crick in 1953 jumped up in Eagle Pub and shouted “We have discovered the secret of _____?”
17. Who is the “Father of Genetics” that was never recognized in his lifetime?
18. Artificial mutation kick started modern genetics. Which scientist won the Nobel prize for discovering that genes are artificially mutable?

Chapter 4

19. Sufferers have a _____, not the gene.
20. Huntington's disease (HD) is caused by a gene in chromosome 4 that codes for what repeat?
21. What year did scientists finally discover the gene for Huntington's disease (HD)?
22. Huntington's disease (HD) causes the death of cells in the _____.
23. Only _____ percent of people who may have inherited Huntington's disease (HD) choose to take a test to tell them if they have the disease.
24. Nancy Wexler helped find the gene involved in Huntington's disease (HD), a disease her mother had. Does Nancy herself have the HD form of that gene?

Chapter 5

25. Are genetic characteristics usually determined by a single gene?
26. Single genes influencing multiple phenotypic traits is known as _____.
27. List 4 hypothesis of how/why asthma is so prevalent today.

Chapter 6

28. In 1997, _____ claimed to have discovered a gene for intelligence.
29. Who came up with the theory of multiple intelligences that recognizes each talent as a separate ability?
30. IQ tests and schools concentrate on _____ problems.
31. Which has the greatest influence on our intelligence?
32. The Flynn effect says IQ is _____ in all countries, all the time.

Chapter 7

33. According to Ridley, is human language inherited?
34. Is the use of grammar, or language rules, something we begin applying early or late in our experience with language (as individuals)?
35. Does the language instinct stay switched "on" forever?
36. Which region of the brain malfunctions in dyslexia?
37. What does evolutionary psychology study?

Chapter 8

38. Do all vertebrates determine the sex of their offspring by the inheritance of the Y chromosome?
39. Do X and Y chromosomes usually swap genes during cell division, as do other chromosome pairs in the nucleus?
40. Why do recessive “X-linked” genetic characteristics show up more often in men and women?
41. How is sex determined in reptiles?
42. What are DAX and SRY genes? Why does Ridley call them “antagonists?”
43. The gene Xq28 is famous for its possible association with what human characteristic?
44. Why does Ridley discuss the X and Y chromosomes between the discussions of Chromosomes 7 and 8 - why not just wait until the end?

Chapter 9

45. What percentage of the human genome is made up of true genes?
46. Of what importance is the human gene that encodes for reverse transcriptase?
47. What are pseudogenes?
48. Who discovered “jumping genes?”
49. What controls gene expression but may be present to suppress transposons?
50. Who was the first man convicted of a crime that involved using DNA fingerprinting?

Chapter 10

51. What blood type is the universal donor?
52. O is the _____ form of the gene for blood.
53. The difference between the A gene and the B gene is really just _____ letters out of 1062.
54. The O gene is a result of a _____.
55. Who suspected that the frequency of sickle-cell anemia in Africa might be connected to the prevalence of malaria?
56. The reason behind genetic variation seems to have something to do with disease. Which gene mutation is NOT paired with the disease it confers resistance to?
 - a. Sickle-Cell with Malaria
 - b. Tuberculosis with Osteoporosis
 - c. Cystic Fibrosis with Typhoid
 - d. Tay-sachs with Cholera
57. Is there truly a human genome?

Chapter 11

58. Progesterone, Aldosterone, cortisol, testosterone and oestradiol are five chemicals made by our bodies that are known as _____.
59. Which hormone is virtually synonymous with stress?
60. Which system is surprisingly effected by the chemical synonymous with stress?
61. The main purpose of most genes in the human genome is _____ the expression of other genes in the genome.
62. Who is in charge - brain, body or genome?
63. The likelihood of a heart attack is best predicted by _____, according to a massive longterm study of civil servants.
64. Who is more susceptible to disease – males or females?

Chapter 12

65. What disease is the extreme form of a shortage of dopamine?
66. How many genes does Hamer estimate to be in tune with personality
67. Kagan found that a high metabolic rate often corresponds to a(n) _____ personality.
68. The drug prozac is given to reduce the symptoms of depression by affecting the _____ system.
69. Impulsive, antisocial and depressed people - including prisoners, violent offenders and failed suicides - have generally _____ cholesterol levels which lead to low levels of serotonin.

Chapter 13

70. The theory of _____ was based on the idea that within the human sperm was a miniature homonculus man.
71. A _____ gene controls the process of knowing where you are and what to do in a developing embryo.
72. Which of the following is NOT a developmental gene described by Nusslein-Volhard and Wieschaus.
 - a. Gap gene
 - b. Pair-rule gene
 - c. Segment-polar gene
 - d. Dorsal-ventral gene
73. The _____ is a sequence of 180 letters at the beginning of all homeotic genes which is responsible for making the protein that allows it to attach to DNA and “switch it on or off.”
74. The homeotic gene for making a fly, a mouse and a human are surprisingly _____.
75. Arthropods and vertebrates are _____ versions of each other.
76. Getting normal fly development while knocking out fly developmental genes and replacing them with human developmental genes is known as _____.

Chapter 14

77. Cavalli-Sforza found a genetic gradient that spread towards the _____ across Europe coincided with languages.
78. Which disease has the Committee for the Prevention of Jewish Genetic Diseases virtually eliminated from the Jewish population in the United States through a controversial “eugenic” program?
79. Is the ability to drink milk and the ability to “hold the drink” (alcohol) genetically based?

Chapter 15

80. What enzyme, encoded by the TEP1 gene on chromosome 14, is needed to prevent senescence (aging) in cells?
81. Which group of organisms has a slightly different repeated telomeric phrase compared to the other organisms?
82. Do most scientists now believe the amount of telomeric DNA, leading to senescent cells is the chief cause of aging?
83. Who is the original owner of immortal cells now used by scientists?
84. What is the quintessential disease of aging?

Chapter 16

85. A gene remembering which parent it came from is known as _____.
86. Is it the maternal or paternal gene that stimulates development of the placenta?
87. Is it the maternal or paternal gene that stimulates development of the cerebral cortex?
88. Which parent is most likely responsible for an offspring's genes for mood?
89. Do gender roles have an innate, genetic basis?

Chapter 17

90. Are most human behaviors inherited or learned?
91. What is the junction between nerve cells?
92. Animals without the CREB protein cannot do what?
93. Does memory consist of the tightening of the connections between neurons.
94. The most vital structure of memory in humans is the _____.

Chapter 18

95. Do we need to lose brain cells?
96. Cells that commit "mutiny" and don't cease dividing are called _____.
97. Chemicals and radiation cause cancer by _____.
98. Which genes can cause cancer?
99. Which protein is called the "guardian angel of the genome?"
100. People born with one faulty TP53 gene out of two have a _____% chance of getting cancer.

Chapter 19

101. In "cutting and pasting" genes in genetic engineering, what enzymes are the "scissors?"
102. In "cutting and pasting" genes in genetic engineering, what enzymes are the "glue?"
103. In the thirty year history of genetic engineering, about how many environmental or public health accidents/incidents have occurred worldwide?
104. What was the first disease treated with gene therapy?
105. An estimated _____% of crop seeds sold in the U.S. by 2000 will be genetically modified.

Chapter 20

106. The APOE gene is important in what group of diseases?
107. There are three variants of the APOE gene in the human population. Are they distributed equally worldwide?
108. According to Ridley, who owns your genetic information, you or the government?

Chapter 21

109. The PRP (Protease-resistant protein) gene codes for what substance in the body?
110. Which human disease is NOT caused by these proteins?
- Gerstmann-Straussler-Scheinker Disease
 - Fatal Familial Insomnia
 - Creutzfeldt-Jakob Disease
 - Bovine Spongiform Encephaly
111. That DNA makes RNA makes protein is known as the _____.

Chapter 22

112. What is the cause of Down Syndrome?
113. Which condition of having an extra chromosome does NOT usually exist in human births?
- extra #9
 - extra #13
 - extra #18
 - extra #21
114. Which countries did not practice eugenics by passing laws?
- Canada
 - England
 - Germany
 - United States
115. When did most countries pass eugenic laws?
116. Is genetic screening eugenics?
117. Does Ridley see the problems of eugenics as “letting science get out of control?”

Chapter 23

118. Is there a human free will gene?
119. Which is more maleabe, nature (genes) or nurture (your environment)?
120. Do parents shape their children or do children shape their parents?
121. Which is more important in shaping your behavior – environment or genetics?
122. Is acting randomly the same thing as acting freely?

Your Inner Fish Reading Assignment

Chapter 00 (Preface)

1. Why do the best road maps to human bodies lie in the bodies of other animals?

Chapter 01

2. Ancient _____ bones can be a path to knowledge about who we are and how we got that way.
3. What percent of species that have ever lived has gone extinct?
4. In what time period do they believe the first fish to walk will be found?
5. Which characteristics (Head Shape) does Tiktaalik share with fish (Conical) and/or land-living animals (Flat)?
6. Which characteristics (Neck) does Tiktaalik share with fish (No) and/or land-living animals (Yes)?
7. Which characteristics (Scales) does Tiktaalik share with fish (Yes) and/or land-living animals (No)?
8. Which characteristics (Appendages) does Tiktaalik share with fish (Fins) and/or land-living animals (Limbs)?

Chapter 02

9. What is the pattern discovered by Sir Richard Owen in the mid-1800s?
10. What modern human exercise was Tiktaalik capable of performing?
11. What adaptations are found in the following organisms:

Acanthostega	_____
Eusthenopteran	_____
Reptilia	_____
Tiktaalik	_____

Chapter 03

12. Do all of our body cells contain the same DNA? Do all of our body cells activate the same genes?
13. When do your limbs begin their development (after conception)?
14. What patch of tissue is responsible for the correct formation of fingers and toes?
15. What gene is activated in all limbed animals?
16. What organism's protein was used in Randy Dahn's research on developmental genetics?

Chapter 04

17. What mineral makes teeth the hardest part of the body?
18. Which reptile species showed tooth-to-tooth occlusion indicating it is part mammal?
19. From what layer of tissue do teeth originate?
20. What was the first bony-headed fish?

Chapter 05

21. What are the fundamental parts of our skull?
22. What do the first four arches become respectively?
23. Bones in us, that are used to swallow and hear, are in sharks to support the _____.
24. What does the notochord become in us?

Chapter 06

25. All organs can be traced to one of three layers of tissue in a developing embryo known as _____ layers.
26. Which tissue layer forms much of our skin and nervous system?
27. Which tissue layer forms our digestive tract and glands associated with it?
28. Which tissue layer forms much of our skeleton and muscles?
29. Flies have eight, whereas humans have thirty nine _____ genes, probably as a result of duplication of the genes in the fly.
30. Who discovered the *organizer* while working with salamander embryos?
31. _____ animals are the same but different.

Chapter 07

32. What breaks the rules that allow cells to work together?
33. When did well-defined bodies show up in the fossil record?
34. What is the most common protein in the human body?
35. Why is cartilage more pliant than bone?
36. Where is the potential to build bodies first seen?
37. What molecules is required to build collagen and ultimately bodies?

Chapter 08

38. Is DNA easy to extract?
39. What percentage of our genome is responsible for detecting different odors?
40. We traded our sense of smell for our enhanced sense of _____.

Chapter 09

41. What percentage of our body's sensory cells are for vision?
42. Vitamin A and the protein _____ are the two parts of the light collecting molecule.
43. How many light gathering molecules do we need to see in color?

Chapter 10

44. What are the three bones that comprise the mammalian middle ear?
45. What is the name of the system in the skin of fish that is comprised of neuromasts?
46. What animal has a mosaic gene that appears like primitive *Pax 2* and *Pax 6* combined?

Chapter 11

47. What does everything have according to Shubin's biological "Law of Everything?"
48. What are we to do if there is a flaw in the framework of how we classify organisms?
49. Which of the following dates does not correspond with the paired biological history?
50. What are we meant to be, based on our hunter-gatherer past?