AP® EUROPEAN HISTORY
2013 SCORING GUIDELINES

Question 4

Analyze the differences between the impact of Newtonian physics on European culture and the impact of Darwinian biology on European culture.

9-8 Points

- Thesis explicitly explains in what ways Newtonian physics and Darwinian biology each impacted European culture.
- Organization is clear, consistently followed, and effective in discussing at least two differing impacts of Newtonian physics and Darwinian biology on European culture — either discussed together or separately.
- Essay is well balanced, discussing both Newton and Darwin, though essay may offer less discussion of one or the other.
- Essay provides relevant evidence of two or more impacts on European culture — at least one per scientist.
- May contain errors in fact or chronology that do not detract from the argument.

7-6 Points

- Thesis explains in what ways Newtonian physics and Darwinian biology each impacted European culture.
- Organization is clear and effective but may be less consistent by providing one developed and one less-developed argument of Newton's and Darwin's differing impacts on European culture.
- Essay is relatively balanced, discussing both Newton and Darwin, though discussion of one or the other may be clearly less developed.
- Essay provides evidence of at least two impacts on European culture — one per scientist.
- May contain an error in fact or chronology that detracts from the argument.

5-4 Points

- Thesis attempts to answer the prompt but may be general, singular, or vague in explaining ways that Newtonian physics and Darwinian biology impacted European culture.
- Organization is clear and effective but may be less consistent by providing one developed or several less-developed arguments about Newton's and Darwin's differing impact on European culture.
- Essay may show imbalance, offering only one valid discussion of Newton or Darwin.
- Essay provides evidence of one or two impacts on European culture.
- May contain a few errors in fact or chronology that detract from the argument.

3-2 Points

- Thesis may restate prompt or offer little or no valid explanation of ways Newtonian physics and Darwinian biology impacted European culture.
- Organization offers minimal argumentation of Newton's or Darwin's differing impact on European culture, or either.
- Essay may show serious imbalance; parts of the prompt are neglected or misconstrued.
- Essay may offer some evidence of cultural impact, but it may be vague or conflated.
- May contain several errors in fact or chronology that detract from the argument.

AP® EUROPEAN HISTORY
2013 SCORING GUIDELINES

Question 4 (continued)

1-0 Points

- No discernible attempt at a thesis.
- Organization may be coincidental, with no argument of Newton's or Darwin's differing impact on European culture.
- Essay may show gross imbalance; parts of the prompt are ignored.
- Essay may offer little, ineffectual, or irrelevant evidence of cultural impact.
- May contain numerous errors in fact or chronology that detract from the argument.

AP® EUROPEAN HISTORY
2013 SCORING GUIDELINES

Question 4 (continued)

Historical Background

The Question

- Students must explain **HOW** Newtonian physics and Darwinian biology each impacted culture differently.
- There is no specific time frame specified.
- The prompt requires students to discuss two or more examples of impact.

.

Clarification

- The phrasing invites students to write separate arguments on Newton's and Darwin's impact on culture, with explicit or implicit discussion of differences.
- The prompt does not require students to explain Newtonian physics or Darwinian biology.
- *European Culture* may be interpreted as European society. Thus, essays could discuss persons (e.g., Voltaire, Spencer, philosophes), institutions (church, government), eras (Scientific Revolution, Enlightenment), intellectual movements (Social Darwinism, Deism) and political trends (imperialism, laissez faire liberalism).
- Essays could discuss contemporaneous time periods, bordering time periods, or both. References to chronologically or thematically more distant developments may be valid but should be looked at carefully on a case-by-case basis (e.g., Industrial Revolution, Nazism).

The Essay

- **Thesis**. Essay must identify ways Newtonian physics and Darwinian biology each affected European culture, that is, how the culture was affected.
- **Organization**. Essay must offer causal linkage between Newtonian physics and Darwinian biology on the one hand and European culture on the other. Discussion of two such linkages satisfies the prompt.
- **Balance**. Essay must discuss the impact of each scientific advance on European culture.
- **Evidence**. Essay must support at least one (combined or separate) societal impact per scientific advance.

Clarifications

- Strong essays will have explicit theses that deal with differing impacts for both scientific advances. Medium essays may only allude to impacts.
- Strong essays will explicitly state the causal effects of each scientist on European culture. Medium essays may describe this in more general or partial terms. Weak essays often fail to address culture specifically.
- Strong essays display sophistication in contrasting multiple developed examples of differing impact. Medium essays often discuss two to three examples in more basic terms. Weak essays tend to highlight one scientist over the other or discuss science rather than culture.
- Strong essays will often distinguish themselves through well-chosen multiple evidence. Medium essays can also display mastery of fact but will typically have less material dealing with causality. Weak essays typically offer only generalizations as evidence.

Question 4 (continued)

- Students must respond to the prompt in the thesis and the body (i.e., HOW these two scientific advances affected culture). Theses that repeat the prompt, elaborate on scientific innovation rather than societal impact, or have no linkage despite rich narratives in the body score low.
- Discussion of incorrect information as part of an attempt to develop the argument constitutes an error that detracts from the essay's argument. Extraneous information not contributing to the argument may be ignored. Occasional minor misstatements should not be counted as errors that detract from the argument.

NEWTONIAN PHYSICS

With his magnum opus *Philosophiæ Naturalis Principia Mathematica* (Mathematical Principles of Natural Philosophy, first published in 1687), natural philosopher **Sir Isaac Newton** (1642–1727) posited universal mathematical principles, formulas, and laws that could explain the motions of terrestrial and celestial objects. Synthesizing the work of Copernicus, Kepler, and Galileo, Newtonian physics dethroned Aristotelian/Ptolemaic cosmology and enhanced the prestige of the scientific method as the means to the truth.

The appeal of natural universal law regulating the material world profoundly impacted European culture:

- *Scientific Academies* promoted mechanical learning (engineering) for the benefit of state power and emerging industry; Newtonian physics arguably helped lay the foundations of the Industrial Revolution.

- The *philosophes* and *salons* of the *Enlightenment* and later figures spread Newton's work to the literate, whose quest for rationality and self-governance sought to apply the concept of uniform, universal laws to human society as well as the natural world; social criticism resulted in both the defense of the free economic forces (Smith) and insistence on natural rights by contract or revolution (Locke, Montesquieu, Rousseau, Hegel, Marx).

- *Deists* argued that Newton's mechanistic cosmology with its universal laws and predictable outcomes was evidence that God had created and set in motion the universe, but then no longer intervened in its working. (As a devout Christian, Newton himself saw no conflict between science and religion and insisted on God's continued intervention in the physical world.)

AP® EUROPEAN HISTORY
2013 SCORING GUIDELINES

Question 4 (continued)

DARWINIAN BIOLOGY

With his groundbreaking study *On the Origins of Species by Means of Natural Selection, or the Preservation of Favored Races in the Struggle for Life* (1859) and subsequent study *The Descent of Man, and the Selection in Relation to Sex* (1871), naturalist **Charles Darwin** (1809–1882) offered empirical evidence for the development of animal and plant life and the emergence of new species over time. He also introduced the principle of natural selection and the struggle for individuals and species to survive.

Darwin's methodology established general principles that have shaped most aspects of the biological sciences since his time. His theory of evolution radically altered conceptions of geologic time and human origins, and, for many, undermined conceptions of man's dominant place in the universe.

The Darwinian challenge to religious faith, hierarchal order, and human behavior had a profound impact on European culture:

- Evolution undermined many people's belief in the Bible's account of the creation of the natural world as it offered an alternative explanation of the development of life without ongoing divine intervention. The adoption of a Darwinian outlook in the biological sciences ultimately led to the end of the (direct) role of religion in questions of science.

- For some, Darwinism led to a questioning of the traditional and Christian notions of the *centrality of man* in the universe. Some interpretations of the theory of evolution relegated humans to a relatively recent species in the history of the natural world.

- Adherents of *Social Darwinism* applied the concepts of natural selection to the social order and contemporary human and international relations. Herbert Spencer (1820–1903) coined the notion of the "*survival of the fittest"* (often misattributed to Darwin) and used it to justify laissez faire economic practices, as well as to promote the notion that certain "races" (usually Europeans) were biologically superior. The misapplication of Darwinian biology led to the justification of European imperialism and nationalistic and militaristic expansion.

4A 1of5

Write in the box the number of the question you are answering on this page as it is designated in the exam.

Sir Isaac Newton and Charles Darwin were two extremely influential figures in the realm of science, whose implications reached into all realms of society. Although both scientists, Newton and Darwin lived in very diffrent times and had very diffrent effects on their respective societies. The theories of Isaac Newton led to the discovery of natural laws and inspired the Scientific Revolution and the Enlightenment while Darwin's theory of evolution led to the notion of Social Darwinism which was used to justify racism, imperialism, and eventually fascism.

Isaac Newton's "Principia," made great advances in mathematics by introducing calculus, while his discovery of gravity prompted the question of what governs the natural world. Newton concluded that the world was governed by natural laws, a radically diffrent notion from what had previously been taught. Natural

Write in the box the number of the question you are answering on this page as it is designated in the exam.

4A2 of 5

laws brought into question the role of God in the universe and led to the idea of the Newtonian World Machine, the idea that God made the universe, but allows it to be governed by natural unchanging laws. The was a very new notion of the universe and led to a questioning of the Scientific Field. Also aiding in the advance of the Scientific Revolution was the Newtonian Synthesis, a new empirial way of collecting data and assesing information. This new approach led to major progresses in science and a questioning of the Catholic Church, which had supported the previous classical theories against these new advances in science.

Newton's progress reverberated throughout society. The Newtonian idea of natural laws gave rise to rationalism: the belief that man is capable of discovering the natural laws that govern the

4A 3of5

Write in the box the number of the question you are answering on this page as it is designated in the exam.

universe through reason. This then gave rise to the Enlightenment, which asserted that if man is capable of discovering natural laws through reason, then progress is inevitable. This can be seen in Adam Smith's notion of the laws of supply and demand, which stated that growing demand will led to the growth of supply, which will create competition and a need for innovation. However, other people such as Montesquie, argued that people do not benefit from natural laws, since population growth will exceed food growth. In any case, Newton's principles of natural laws led to a questioning of the status quo and greater skepticism that inspired the enlightenment. Other ideas such as the Newtonian World machine inspired the idea of deism, or the belief that God created the world, but allows it to be

governed by natural laws. Voltaire was a strong advocate of deism and questioned the role of organized religion.

Like Newton, Charles Darwin also had a profound impact on society. Rather than study Physics, Darwin specialised in Biology. Darwin's theory of evolution revolutionized how the world works. It also questioned church authority by questioning the origins of mankind. This translated to the idea of Social Darwinism, or the belief that some people are naturally superior to others. This was then used to justify imperialism, racism, and fascism. It also inspired Hitlers beliefs in the superiority of the German people and the aryan race. A great example of social Darwinism is the "White Man's Burden," a book written to justify imperialism.

Although Newton and Darwin

4A 5 of 5

Write in the box the number of the question you are answering on this page as it is designated in the exam.

were both very influential, they're theories had diffrent, perhaps unintentional effects. The theories of Newton inspired the Scientific Revolution and the Enlightenment, while the theories of Darwin led to social Darwinism and the justification of racism, imperialism, and fascism. Although vastly diffrent, the theories of Newton and Darwin led to a questioning of the status quo, and both men contibuted greatly to the field of science.

Write in the box the number of the question you are answering on this page as it is designated in the exam.

4 Big Q

Newton and Darwin's theories shook Europe. During the age of Enlightenment, people began to rely less on religion and more on their observations of the world. Newtonian physics had a greater impact on religion while Darwinism had a greater affect on Europes View of Imperialism.

With Newton's laws of gravity, individuals were able to understand the world around them without refering to religion. Newton's theories did not discredit religion as a whole but promoted a new form of religion in Deism. Deism portrayed God as this ultimate clock worker; He set everything in motion and left it ~~alone~~ alone. This view greatly contrasted and conflicted with Christianity. Skepticism in religion would be replaced ~~with~~ by the observation of scientist.

While Newton's physics greatly impacted religion, Darwin's biology paved the way towards ~~empire~~ Imperialism. Darwin portrayed that some species were more evolved then others. This view gave birth to Social Darwinism. Europeans thought it was their duty to civilize the world. This became the "white

4B 2012

Write in the box the number of the question you are answering on this page as it is designated in the exam.

man's burden. Europe ~~contacted~~ + pilaged Africa, India, and Asia with the ~~heinous~~ belief that they were ~~superior to and greatly superior~~ "civilizing" a barbaric people. Racism ran rampit. ~~of~~ Africa was carved up and exploited for their rich mineral deposits. Britain seized control of India as a gateway to trade with Asia. These ~~countries~~ countries suffered due to Darwin's biology. His theories were taken to the extreme and much violence and bigotry was created

~~While~~ White Newton's theories greatly impacted religion within the European culture, Darwin's biology paved the way towards Social Darwinism. Social Darwinism was used as an excuse to conquer and exploit under developed nations. It was the "white man's burden" to civilize the world. Newton's theories gave rise to Deism. The universe could now be explained through human observations. This greatly shook the foundation of the church. Religion became mechanistic in view.

Write in the box the number of the question you are answering on this page as it is designated in the exam.

4C 1of2

Newtons theory on physics did not go against the church like darwin did, the impact of darwins therory of evolution was a big but contriuversal discovery, no one wanted to believe in. The church was not happy at all, god was put aside for science, Newtons theory on physics was a very huge discovery, gravity, speed, time, both huge and astronomical discovery by two of the smartest and most famous scientist in our history, yet they impacted the culture quiet diffrently.

Charles Darwin, a biologist, or scientist, discovered ~~that~~ that us humans ~~could~~ evolved from diffrent species over millions of years, this theory was known as Evolution. there was just one problem, the Evolution contridicted the catholic church and ~~but~~ said that we Evolved, and were not created by god. going against the church in any way will make the church very unhappy. Galileo went against the ~~the~~ church, by saying that he didn't Put heven into ~~the~~ space, that the stars were not heaven, and he was put on house arrest and died in house arrest. Newtons theory on physics was quiet less contriuversal, and made a massive impact ~~on the~~ scientificly on the ~~culture~~ of Europe. no one ever~~s~~ thought of it, newton found gravity, and velocity, speed, time, making his mark on the scientific history.

4C 2of2

Write in the box the number of the question you are answering on this page as it is designated in the exam.

Darwin and Newtons ~~theory~~ theories were influencal and astounding finds in the world of science, yet both were quite different, darwin's theory on evelution was disline and disowned by the church, Newtons theory was not as ~~controversy~~ controversal.

AP® EUROPEAN HISTORY
2013 SCORING COMMENTARY

Question 4

Overview

The question was intended to assess students' ability to synthesize and explain the differing impacts of Newtonian physics and Darwinian biology on European culture. The prompt purposefully repeated the impact statement to remind students that this essay should focus on culture, rather than science. The absence of a specific time frame allowed for students to develop full arguments.

Sample: 4A
Score: 9

This essay offers a sophisticated analysis of the influences of Newtonian and Darwinian thought on European culture. The thesis explicitly explains the differing impacts of Newtonian physics (the solidification of the idea of natural laws that informed Enlightenment inquiries) and Darwinian biology (Social Darwinism that led to racism) on European culture. The organization of the essay effectively supports its presentation of Newton's impact on society (God's place in a Newtonian world; natural laws applied to society; skepticism leading to Deism) and Darwin's impact on society (questions of religious accounts of humanity's origins; effects of Social Darwinism).The essay is well-balanced with slightly better development on Newton than on Darwin. Evidence includes three well-developed examples of differing societal impact, and errors are negligible. The sophistication of this essay and its well-developed analysis earned it a score higher than 8.

Sample: 4B
Score: 6

The thesis is direct and to the point in explaining the differing impacts of Newtonian physics (less reliance on religion) and Darwinian biology (views on Imperialism) on European culture; the concluding statement provides a better developed thesis than the introduction. The organization is straightforward; the essay first discusses Newton's impact on society (discredited religion and promoted Deism) and then Darwin's impact on society (Social Darwinism giving rise to imperialism). Evidence includes one example of Newton's impact and one example of Darwin's impact with a degree of specificity, with no detracting error. The arguments in this essay are straightforward with sufficient evidence, but they lack elaboration, detail, and nuanced discussion of how the scientific discoveries changed European culture. This essay scored higher than a 5 because it explains and supports the entire prompt with a degree of specificity. However, it scored lower than a 7 because the discussion is more narrative than analytical and lacks sophisticated linkages between scientific discoveries and wider European culture.

Sample: 4C
Score: 3

This essay makes a weak attempt at answering the question. The thesis is confused and partially repeats the prompt, offering little explanation of the impact of Darwinian biology on European culture. The essay is poorly organized and shows serious imbalance. It offers vague evidence of church reaction to evolution; the discussion of Galileo is off task. The essay received a score higher than 2 because of its partially successful attempt at addressing the prompt and its lack of serious errors. The essay received a score lower than 4 because of its lack of specificity and poor development of the discussion on Newton.