

PRSMS

Document Analysis Learning

Using a school-wide
document based question.

Name: _____

S.S. Teacher: _____

Grade: __7-8__

Document Score: _____

Essay Score: _____

DOCUMENT-BASED QUESTION

How have Scientific Discoveries Caused Conflict and Change in Society?

This question is based on the accompanying documents. It is designed to test your ability to work with historical documents. Some of these documents have been edited for the purposes of the question. As you analyze the documents, take into account the source of each document and any point of view that may be presented in the document.

Historical Context:

Directions:

The task below is based on documents 1 through 10. This task is designed to test your ability to work with the information provided by various types of documents. Look at each document and answer the question or questions after each document. Use your answers to the questions to help you write your essay.

There are several steps to forming an educated opinion.

1. In Social Studies, read the Background Information. The reading tells about a recent scenario surrounding science and social change or conflict.
2. Quickly skim through the documents to get a sense for what they are about.
3. Read the documents slowly. For each, use the margins to record:
 - a. What or who is the source? Is it primary or secondary?
 - b. What is the main idea (or main ideas) in the document?
4. Organize the documents into categories by noting whether it is change or conflict in the upper left corner of the document.
5. Prioritize your ideas. What is the most important contribution/conflict? What is second?
6. Explain your priorities. Why is one more important than another?

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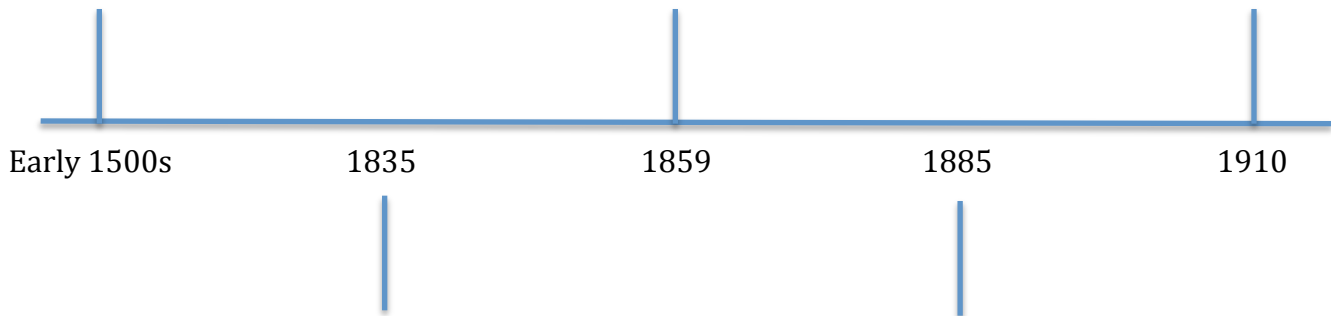
Document 11 (Social Studies): Anti-Evolutionism

Categorization Worksheet: Buckets

Essay Planning Worksheet

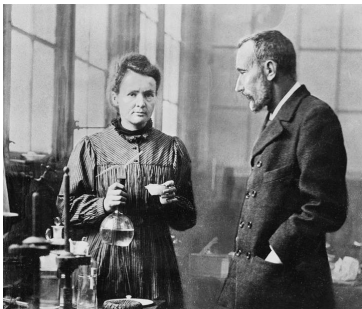
Self-Check Rubric

Hook Activity (Science): Discovery Timeline



Directions: Match the picture with the date then cut and place them in order on the timeline above.

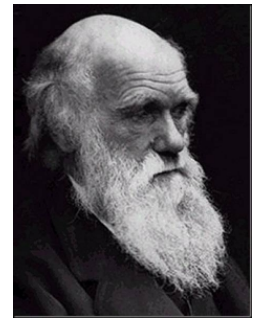
Discovery of Radium



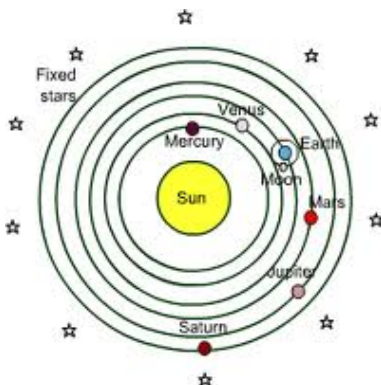
Cloning of Living Organisms



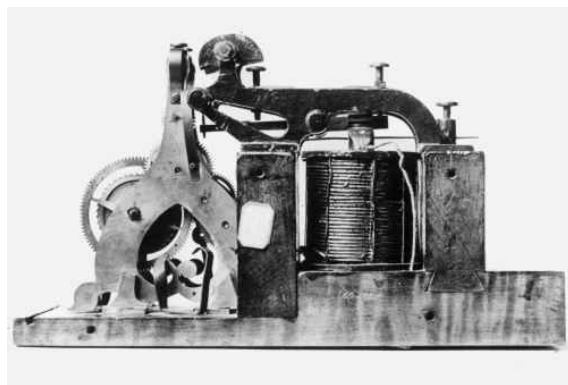
Theory of Evolution



Heliocentric Universe



Telegraph



Part A: Background Information (Social Studies)

Science controversies past and present

Source: *Physics Today* “Science Controversies, Past and Present,” Steven Sherwood. October 2011.
http://www.physicstoday.org/resource/1/phtoad/v64/i10/p39_s1?bypassSSO=1

In the decades before Galileo began his fervent promotion of Copernicanism, the Catholic Church took an admirably philosophical view of the idea. As late as 1615, Cardinal Robert Bellarmine acknowledged that “we should . . . rather admit that we did not understand [Scripture] than declare an opinion to be false which is proved to be true.” But the very next year he officially declared Copernicanism to be false, stating that there was no evidence to support it, despite Galileo’s observations and Kepler’s calculations. Institutional imperatives had forced a full rejection of Copernicanism, which had become threatening precisely because of the mounting evidence.

Even Albert Einstein was not immune to political backlash. His theory of general relativity undermined our most fundamental notions of absolute space and time, a revolution that Max Planck avowed “can only be compared with that brought about by the introduction of the Copernican world system.” Though the theory predicted the anomalous perihelion shift of Mercury’s orbit, it was still regarded as provisional in the years following its publication in 1916.

When observation, by Arthur Eddington and others, of a rare solar eclipse in 1919 confirmed the bending of light, it was widely hailed and turned Einstein into a celebrity. Elated, he was finally satisfied that his theory was verified. But the following year he wrote to his mathematician collaborator Marcel Grossmann: This world is a strange madhouse. Belief in this matter depends widely on political party affiliation.

Instead of quelling the debate, the confirmation of the theory and acclaim for its author had sparked an organized opposition dedicated to discrediting both theory and author. Part of the backlash came from a minority of scientists who apparently either felt sidelined or could not understand the theory. The driving force was probably professional jealousy, but scientific opposition was greatly amplified by the anti-Semitism of the interwar period and was exploited by political and culture warriors. The same forces, together with status quo economic interests, have amplified the views of climate contrarians.

The historical backlashes shed some light on a paradox of the current climate debate: As evidence continues to accumulate confirming longstanding warming predictions and showing how sensitive climate has been throughout Earth’s history, why does climate skepticism seem to be growing rather than shrinking? All three provocative ideas—heliocentricity, relativity, and greenhouse warming—have been, in Kuhn’s words, “destructive of an entire fabric of thought,” and have shattered notions that make us feel safe. That kind of change can turn people away from reason and toward emotion, especially when the ideas are pressed on them with great force.

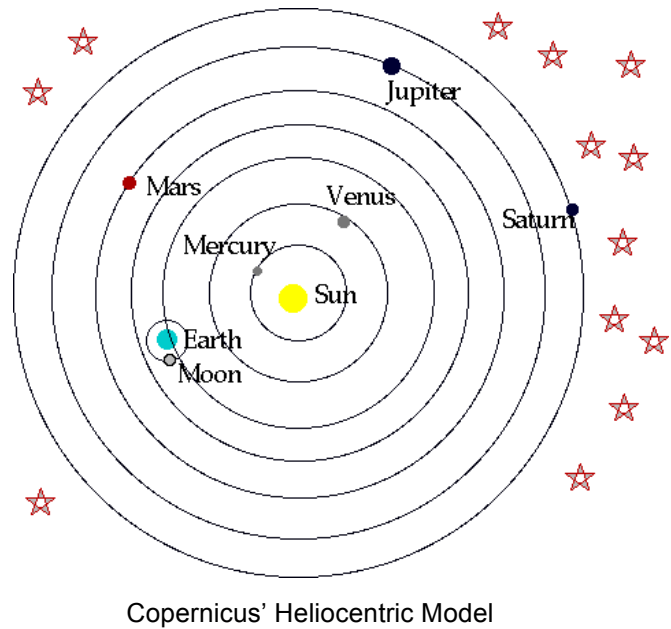
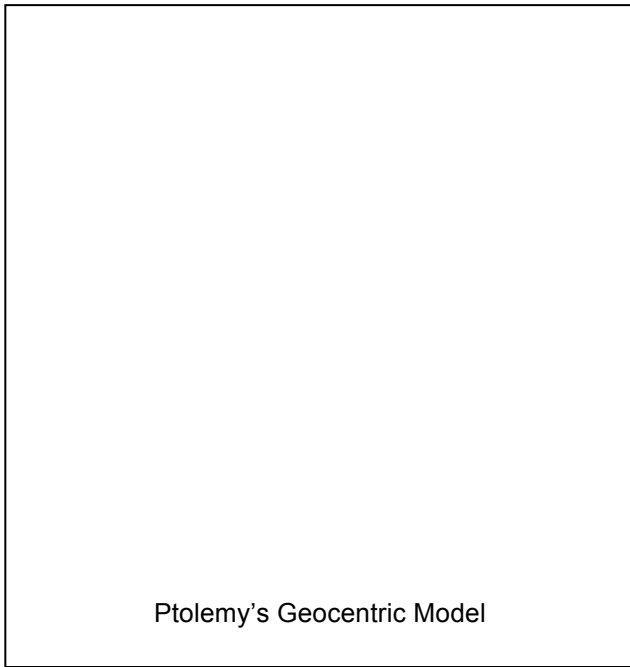
Copernicanism as it grew scientifically solid shocked many devout Catholics. Likewise, modern conservative political parties have until recently been friends of science, including climate and environmental studies. In the 1970s Republicans and Democrats in Congress were equally concerned about climate change, and as recently as 2004 leading Republicans were—at least in public—enthusiastic in their support of science. Their recent rejections of climate science have probably shocked many supporters. In both cases the backlash seems to have come when leaders were pushed to act on the basis of new evidence.

Part B: Short-Answer Questions

Directions: Analyze the documents and answer completely the short-answer questions that follow each document in the space provided.

Document 1 (Math): Ancient Diagrams of the Universe

Note: The heliocentric model, which means sun centered, gradually replaced the geocentric model. This new system places the Sun at the center of the Solar System with the Earth and all the other planets orbiting it. This theory revolutionized everything because it reversed centuries of established opinion. Although the idea of a heliocentric model had been around as early as 200 B.C., it did not gain popularity until the 16th century. The Christian Church's doctrine was pretty much solidified 1500 years ago, but heavily influenced by Greek and Roman philosophers, especially in its views of science. Among those teachings lay the solid belief in a geocentric universe, very much advocated by Aristotle (384-322 B.C.) and expanded by Ptolemy (A.D. 85-165). "Geocentric" means Earth -centered - the Earth is the center of everything, and especially the center of the solar system.



1. What is the major difference between the heliocentric model and the geocentric model?

2. Why might the Church have fought accepting Copernicus' model?

3. What is wrong with the theory put forth by Copernicus based on what we know today?

Document 2 (Social Studies): Galileo; the Universe and the Church

Note: Galileo (1564-1642) supported Copernicus's Heliocentric Theory and argued against the Church, which supported the Geocentric (Earth centered) Theory of the universe based on theological ideas found in the Bible. This conflict ultimately led to Galileo being placed on house arrest until his death.

Source: "After 350 Years, Vatican Says Galileo Was Right: It Moves," The New York Times," By Alan Cowell. October 31, 1992

More than 350 years after the Roman Catholic Church condemned Galileo, Pope John Paul II is poised to rectify one of the Church's most infamous wrongs -- the persecution of the Italian astronomer and physicist for proving the Earth moves around the Sun.

With a formal statement at the Pontifical Academy of Sciences on Saturday, Vatican officials said the Pope will formally close a 13-year investigation into the Church's condemnation of Galileo in 1633. The condemnation, which forced the astronomer and physicist to recant his discoveries, led to Galileo's house arrest for eight years before his death in 1642 at the age of 77.

The dispute between the Church and Galileo has long stood as one of history's great emblems of conflict between reason and dogma, science and faith. The Vatican's formal acknowledgement of an error, moreover, is a rarity in an institution built over centuries on the belief that the Church is the final arbiter in matters of faith.

1. What did Galileo believe about the universe?

2. How did this conflict with the views of the Church at this time?

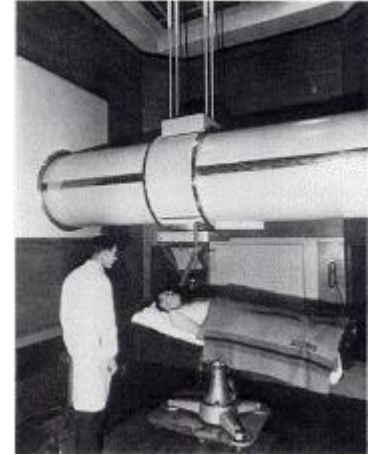
3. Regarding the universe, what is the Church's current view?

Document 3 (Language Arts): Marie Curie's Discovery of Radium

Source: Based on the book *Marie Curie and the Science of Radioactivity*, by Naomi Pasachoff, 1996.
http://www.aip.org/history/curie/brief/03_radium/radium_4.html

The public and industrialists were fascinated by the Curies' discoveries. Radium, inexhaustibly giving out energy (you could see the light, and it gave out heat too), hinted at great mysteries and perhaps amazing inventions. Moreover, Pierre proved that radium could damage living flesh. That opened a new way to treat cancer and other ailments. But Marie lost nearly 20 pounds while doing her doctoral research, and Pierre was often exhausted and in pain. Was it overwork and stress, or was radiation the cause of their frequent illnesses? Marie refused to believe that radiation was very harmful, but doctors today think otherwise.

Industrial firms saw an opportunity in the Curies' research. They helped the Curies by providing additional lab space, raw materials, and support staff. A thriving industry grew up, extracting radioactive substances for medical uses (and other uses too, like watches that glowed in the dark). Radium was also used by scientists for experiments on atoms. They confirmed what Marie had suspected—the powerful energy that showed up in radioactivity was a fundamental property of every atom of matter.



A large dose of radiation will kill people. But, in controlled doses, as in the treatment of this patient, radiation can destroy cancer cells and attack other diseases. Radiation therapy has saved millions of lives.

1. What major advancements came about due to the Curie's discovery?

2. Explain the positive and negative effects of using radium.

3. Why were industrial firms intrigued with Curie's findings?

Document 4 (CCTE/Int. Rdg.):

The controversy over radiation safety. An historical overview.

Source: Walker JS. US Nuclear Regulatory Commission, Washington, DC. 20555. JAMA, Aug. 4, 1989.
<http://www.ncbi.nlm.nih.gov/pubmed/2664237>

Note: Discovery of the element radium by Marie Curie has led to advances in medical testing and treatments to cure diseases at the cellular level. Additionally, its discovery also began scientists along a path that would lead to atomic bombs and nuclear power.

The hazards of ionizing radiation have aroused concern since a short time after the discovery of x-rays and natural radioactivity in the 1890s. Misuse of x-rays and radium prompted efforts to encourage radiation safety and to set limits on exposure, culminating in the first recommended "tolerance doses" in 1934. After World War II, the problems of radiation protection became more complex because of the growing number of people subjected to radiation injury and the creation of radioactive elements that had never existed before the achievement of atomic fission. Judging the hazards of radiation became a matter of spirited controversy. Major public debates over the dangers of radioactive fallout from atmospheric bomb testing in the 1950s and early 1960s and the risks of nuclear power generation in later periods focused attention on the uncertainties about the consequences of exposure to low-level radiation and the difficulties of resolving them.

1. Based on the article, what are "tolerance doses"? Why were they recommended?

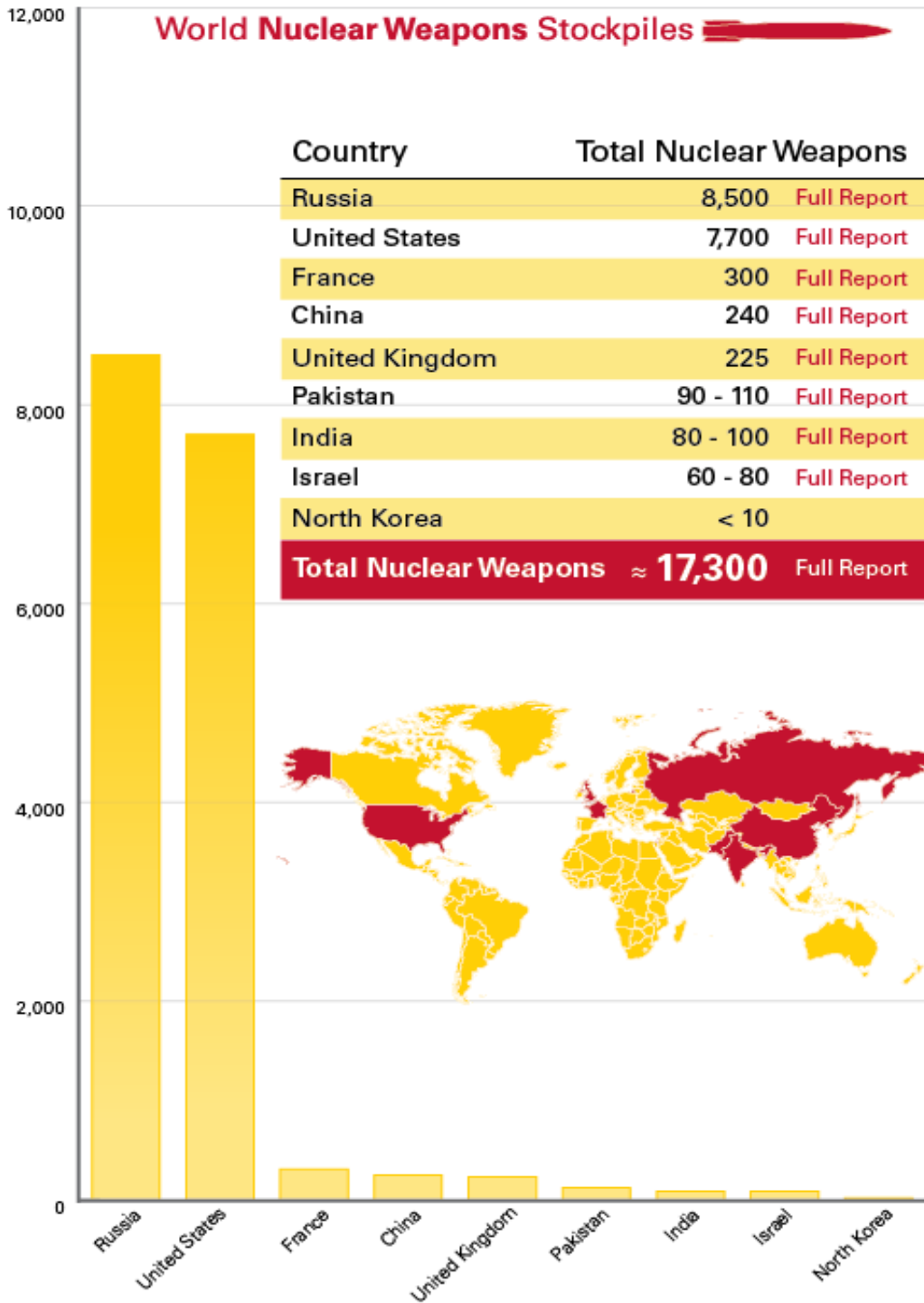
2. What positive changes came about as a result of the use of radiation?

3. What conflicts have been created as a result of the use of radiation?

Document 5 (Math): World Nuclear Stockpile Report

Note: The discovery of radium led to development of medical technology and weapons as well. The exact number of nuclear weapons in global arsenals is not known. With little exception, each of the nine countries with nuclear weapons guards these numbers as closely held national secrets. What is known, however, is that more than a decade and a half after the Cold War ended, the world's combined stockpile of nuclear warheads remain at unacceptably high levels.

Source: <http://ploughshares.org/world-nuclear-stockpile-report> Updated May 2, 2013



1. Which countries have the largest amount of weapons?

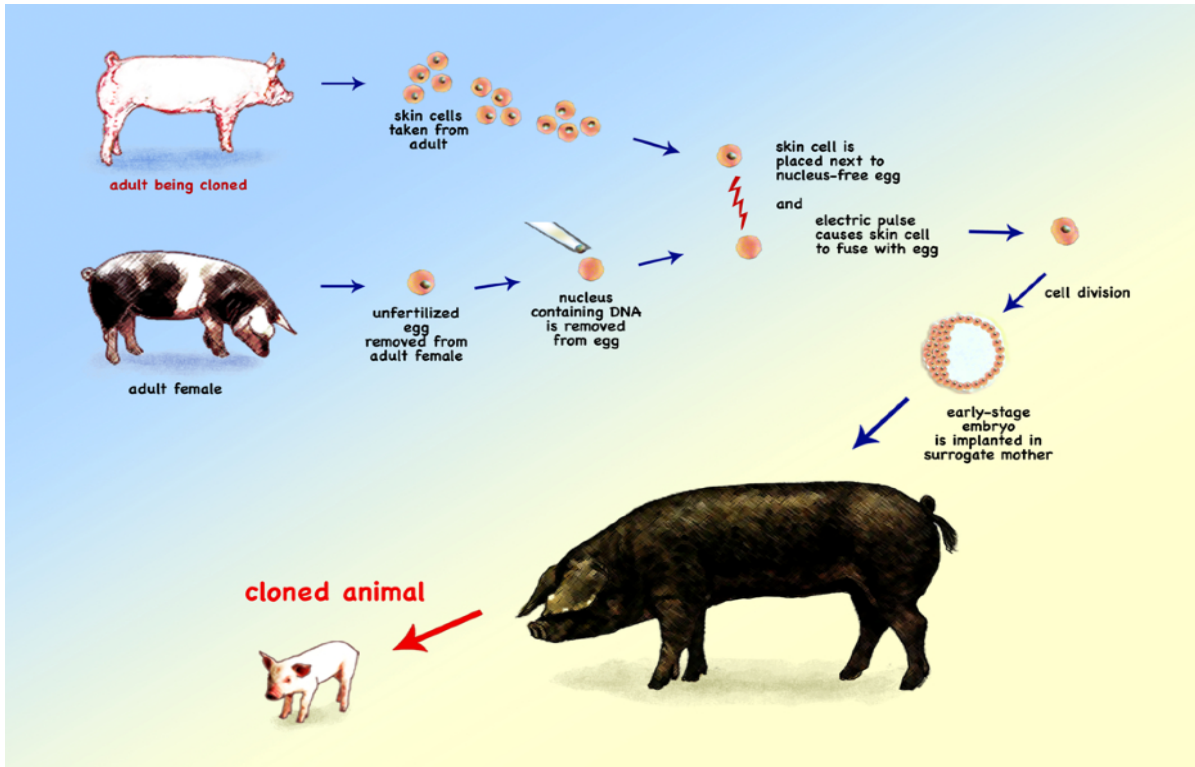
2. What do you believe the purpose of stockpiling nuclear weapons?

3. Why do countries protect the knowledge about the weapons?

Document 6 (Fine Arts): What is Cloning?

Note: The term cloning describes a number of different processes that can be used to produce genetically identical copies of a biological entity. The copied material, which has the same genetic makeup as the original, is referred to as a clone. Researchers have cloned a wide range of biological materials, including genes, cells, tissues and even entire organisms, such as a sheep.

Source: genome.gov National Human Genome Research Institute, National Institutes of Health



1. Summarize the process of cloning a biological entity.

2. Why might certain groups support or object to cloning?

3. What impact on society could cloning cause?

Document 7 (Language Arts): Views on Cloning

Note: In the debate over cloning, there are those that feel that the benefits and advances gained from cloning outweigh any social dilemmas, and there are those feel that cloning is wrong on a fundamental moral level and would produce scientific and social problems. In weighing in on these views, major organizations draw on numerous sources including religious law, party philosophy and scientific concern. Some object to cloning on a purely ethical level, while others favor cloning solely for the scientific advances it will produce. These are the stances of some prominent religious, scientific, and ethical groups.

The Catholic Church: John Paul II released a statement condemning the cloning of all life forms. The Vatican also issued a statement that only condemned human cloning, but did not address other forms.

Judaism: The Chief Rabbi of Israel, Meir Lau, stated that the cloning of any creature is against Jewish law. However, some believe cloning in order to produce better food and medication would be allowable in Jewish tradition.

Biotechnology Industry Organization: Carl Felbaum, president, *"One of the prospects should not be, perhaps should never be, the extension of this technique to human beings... Now that it may be possible we would say it should be prohibited if necessary by law."*

Libertarian Party: Steve Dasch, chairman- *"Politicians should not have veto power over the creation of new life - especially human life...That's why the Libertarian Party supports reproductive freedom of choice for Americans-whether they choose to reproduce using the traditional method, or artificial insemination, or in-vitro fertilization, or cloning... if cloning research is banned, millions of people could suffer."*

Foundation of Economic Trends: Jeremy Rifkin, president- Proposing a world-wide ban on cloning, he says it should carry a penalty *"on par with rape, child abuse, and murder."*

Church of England Board of Social Responsibility: Mary Seller- *"The antics of a few cranks and Hitler types" should not impede cloning research. "Cloning, like all science, must be used responsibly. Cloning humans is not desirable. But cloning sheep has its uses."*

Stephen Grebe: professor of biology, American University- *"We're going to be facing this issue with humans... With that possibility open, I'm concerned without safeguards that this will become a reality. It may very well already be."*

1. What are the pros to cloning according to the viewpoints above?

2. What are the cons to cloning according to the viewpoints above?

3. What are the major differences between religious, scientific, and ethical stances?

Document 8 (CCTE/Int. Rdg.): Samuel Morse and the Telegraph

Note: In 1844, time and distance were annihilated by the electric telegraph—the marvelous invention of Professor Samuel Morse. This miraculous invention later led to the telephone, radio, TV . . . and eventually the Internet!

Source: <http://www.reformation.org/what-hath-god-wrought.html> Copyright © 2013 by Patrick Scrivener

On May 24, 1844, Professor Samuel Morse sent the first message via electricity from Washington City to Baltimore.

By 1855, telegraph lines covered most of the eastern United States and the most ambitious plan of all was a transatlantic cable linking the United States with Great Britain.

President Lincoln used the telegraph to reach out to his generals in the field and the vast Union armies communicated frequently by telegraph.

By 1861, the telegraph line had reached the Pacific Ocean and Western Union was given the mammoth task of extending it to Russian Alaska.

Beginning in 1865, \$3,000,000 was spent by the Western Union company to extend the line to the Bering Strait. The daring proposal was for ALL of Asia to be connected to the U.S. via Russia.



1. What technological advancements can be traced back to the invention and use of the electric telegraph?

2. How did the telegraph transform the way people around the world communicate?

Document 9 (Science): Hypothesizing Wireless Communication

Source: Imagining the Internet-A History and a Forecast <http://www.elon.edu/e-web/predictions/150/1960.xhtml> , Elon

Note: Thanks to the work of thousands of collaborators over the final four decades of the 20th century, today's Internet is a continually expanding worldwide computer network used for the transport of many types of data. Wireless satellite and broadband communications networks are helping people in even the most remote locations find ways to connect. Overcoming the initial concerns that commercialization would limit creativity or freedom of speech, the Internet has become a crazy mix of commercial sites, government information, and incredibly interesting pages built by individuals who want to share their insights. The number of people making Internet pages continues to grow. As of mid-2004, more than 63 million domain names had been registered, approximately one for every 100 people living in the world.

AT&T Chief Engineer and Electrical Review writer John J. Carty projected in his "Prophets Column" in 1891:

"A system of telephony without wires seems one of the interesting possibilities, and the distance on the earth through which it is possible to speak is theoretically limited only by the curvature of the earth."

Carty also wrote:

"Someday we will build up a world telephone system, making necessary to all peoples the use of a common language or common understanding of languages, which will join all the people of the earth into one brotherhood. There will be heard throughout the earth a great voice coming out of the ether which will proclaim, 'Peace on earth, good will towards men.'"

1. In 1891, what did AT&T writer, Carty, hypothesize about communication in the future?

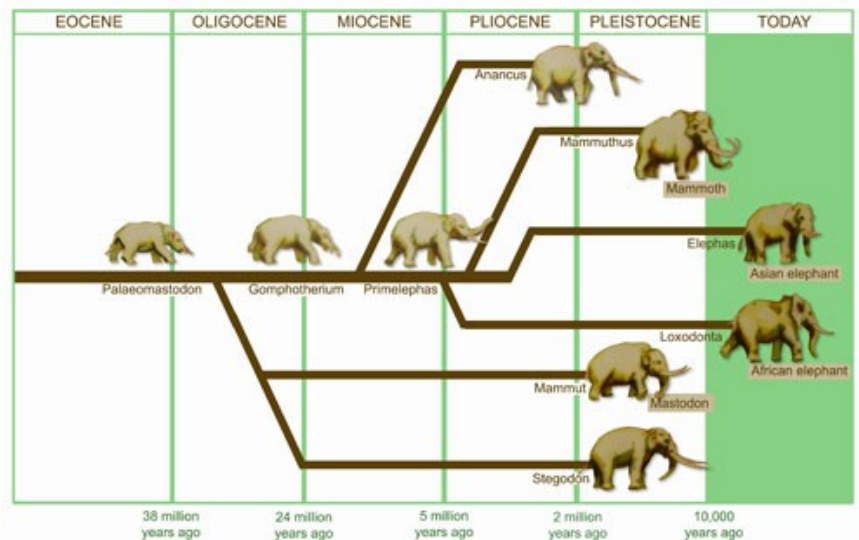
2. Explain how Carty's prediction can be validated.

3. Is any part of Carty's prediction disputable?

Document 10 (Science): Darwin's Theory of Evolution

Source: American Museum of Natural History: Darwin. <http://www.amnh.org/exhibitions/past-exhibitions/darwin> and Charles Darwin & Evolution. http://darwin200.christs.cam.ac.uk/pages/index.php?page_id=d3

Note: Darwin's theory of evolution by natural selection underlies all modern biology. It enables us to decipher our genes and fight viruses, and to understand Earth's fossil record and rich biodiversity. Simple yet at times controversial, misunderstood and misused for social goals, the theory remains unchallenged as the central concept of biology. Charles Darwin, reluctant revolutionary, profoundly altered our view of the natural world and our place in it.



Darwin's five theories were:

- i. **Evolution:** species come and go through time, while they exist they change.
- ii. **Common descent:** organisms are descended from one, or several common ancestors and have diversified from this original stock
- iii. **Species multiply:** the diversification of life involves populations of one species diverging until they become two separate species; this has probably occurred billions of times on earth!
- iv. **Gradualism:** evolutionary change occurs through incremental small changes within populations; new species are not created suddenly.
- v. **Natural selection:** evolutionary change occurs through variation between individuals; some variants give the individual an extra survival probability.

1. What ideas did Charles Darwin have about living species?

2. How do you think these ideas have influenced biology?

Document 11 (Social Studies): Anti-Evolutionism

Source: The Evolution of Evolutionism. Dr. Karl Giberson

Note: 1925: Scopes "Monkey Trial" The story of the Scopes trial is retold in this Paramount and Pathe News film "Greatest Headlines of the Century," produced in 1960. In 1925, John Scopes was convicted and fined \$100 for teaching evolution in his Dayton, Tenn., classroom. The first highly publicized trial concerning the teaching of evolution, the Scopes trial also represents a dramatic clash between traditional and modern values in America of the 1920s.

Anti-evolution reappeared in a new form in a 1982 trial in Arkansas with a more modest demand for a "balanced treatment of creation science and evolution science." If creationism could not be legally mandated as the only thing taught about origins, surely it was reasonable to demand that it have a place alongside evolution. In a much examined decision, Judge Overton declared that creationism was religion and had no place in America's science classrooms.

Overton's decision effectively guaranteed that creationism -- at least any version resembling the biblical story, which the Arkansas version did -- would never have a place in science classrooms funded by American taxpayers. The decision forced the anti-evolution movement to adopt a new strategy, known as Intelligent Design or ID.

The supporters of ID, who are strongly anti-evolution and overwhelmingly Christian, promote the idea that a creative "intelligence" is responsible for the appearance and development of life on earth. Because they don't identify this intelligence as God -- the only actual alternative they have ever offered is that it could be "space aliens" -- ID must be regarded as non-religious.

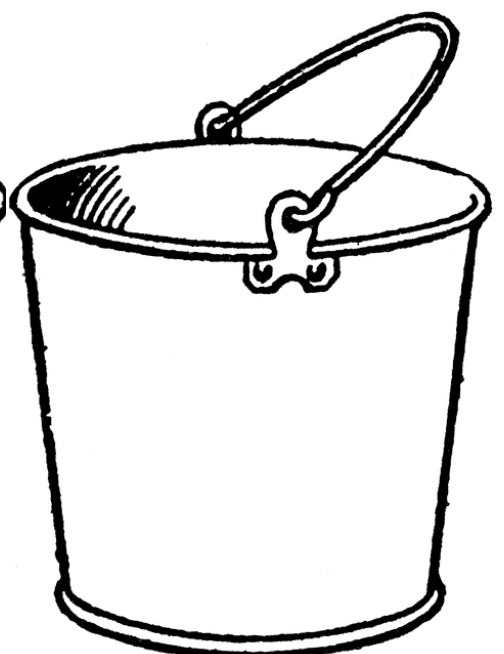
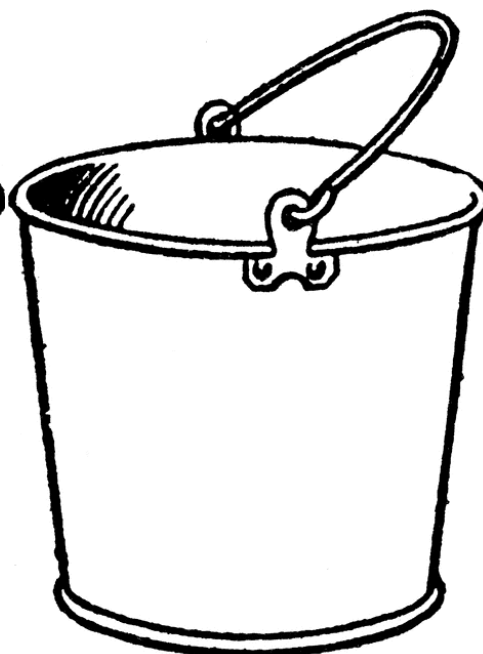
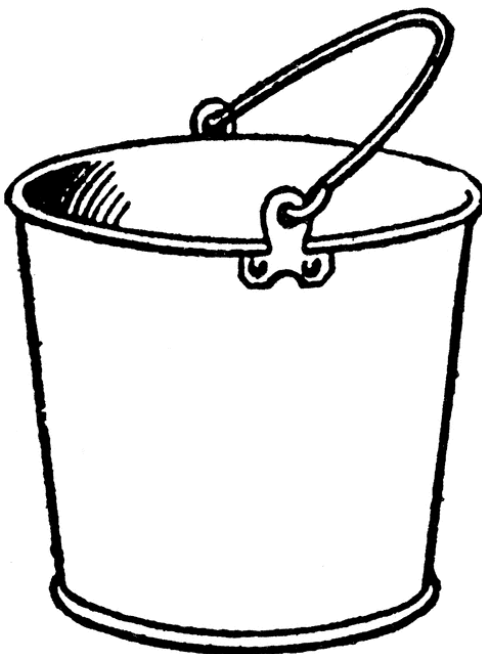
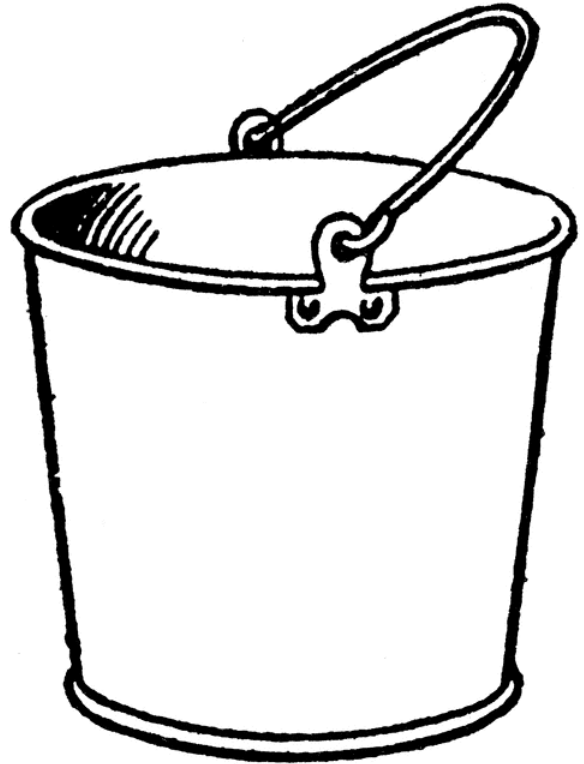
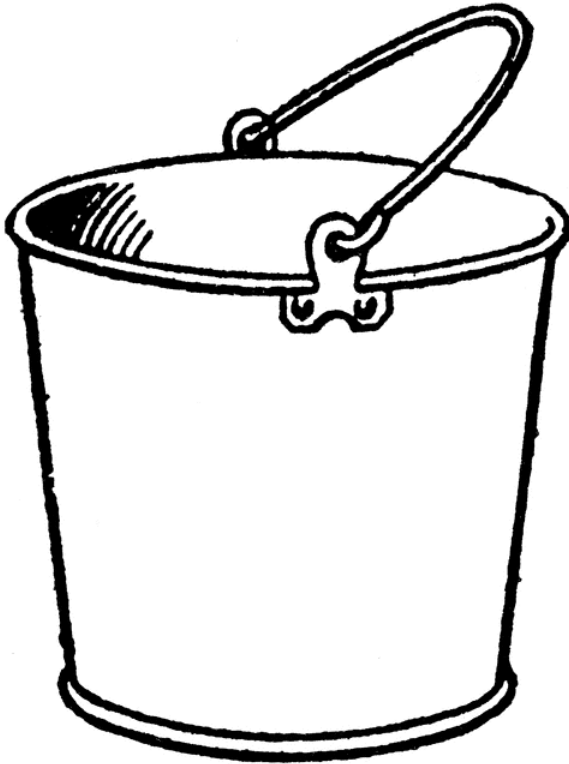
ID went on trial in Dover, PA in 2005 after a local school board mandated a curriculum requiring the teaching of ID, and promoting an ID textbook *Of Pandas and People* as the appropriate anti-evolutionary resource. The trial was a disaster for ID. The textbook was shown to have been a creationist text that had replaced "creationism" with "intelligent design." The judge handed down an aggressive ruling that ID was really creationism, and thus religious.

1. What conflict exists in American society about teaching Evolution?

2. What are the reasons for supporting the teaching of Evolution, but not Intelligent Design?

Categorizing through buckets (analytical categories or clusters)

Group the documents into buckets, by deciding the underlying commonality. This will provide the basis for organizing your essay.



DBQ Essay Outline—Working Title:

Introduction

Grabber/Hook

Background/Context

Restate question explaining specific vocabulary.

Thesis and road map (your position/claim and main points—chicken foot)

Counterclaim (optional)

Body #1

Thesis (claim) for bucket #1

Evidence (proof): supporting detail with reference to specific document(s)

Argument (example): connecting evidence to the thesis

Body #2

Thesis (claim) for bucket #2

Evidence (proof): supporting detail with reference to specific document(s)

Argument (example): connecting evidence to the thesis

Body #3

Thesis (claim) for bucket #3

Evidence (proof): supporting detail with reference to specific document(s)

Argument (example): connecting evidence to the thesis

Conclusion

Statement of main idea. Read YOUR essay and summarize the ideas in 2-3 sentences.

Clinch your argument.

Document Based Question Self-Scoring Guide (3 Bucket Essay)
Score Scale 0-21 points

Basic Core	Points			Expanded Core	Points		
	Total Possible points	Self-Score	Teacher Score		Total Possible Points	Self-Score	Teacher Score
				Expands beyond Basic Core 1-19. Students must achieve a basic score of 19 before earning ANY expanded core points. The maximum number of expanded core points is limited to a total of 3 points.			
Introduction					3		
Utilizes a hook/grabber	1			Examples: <ul style="list-style-type: none"> • Has a clear, analytical and comprehensive thesis • Addresses all parts of the question thoroughly • Uses all or almost all of the documents (DBQ) • Shows understanding of nuances in documents • Analyzes point of view in four or more documents • Analyzes documents in other ways with additional groupings • Brings extensive and relevant "outside" historical information • States a counter-argument (however statement) 			
Incorporates background knowledge	1						
Has acceptable thesis with road map	1						
Body Paragraphs							
Analyzes and organizes documents in at least 3 groups	1						
Uses all documents (in Mini-Q) Uses majority of documents (in DBQ)	1						
Analyzes point of view or bias (if possible in DBQ)	1						
Document Reference citations (DOC A)	1						
1st Body Paragraph							
Relates claim statement to the thesis	1						
Provides evidence taken directly from documents	1						
Makes an inference and/or argument that explains the evidence taken from the document	1						
2nd Body Paragraph							
Relates claim statement to the thesis	1						
Provides evidence taken directly from documents	1						
Makes an inference and/or argument that explains the evidence taken from the document	1						
3rd Body Paragraph							
Relates claim statement to the thesis	1						
Provides evidence taken directly from documents	1						
Makes an inference and/or argument that explains the evidence taken from the document	1						
Conclusion							
Restates thesis	1						
Clinches argument	1						
Conventions							
Grammar, spelling & neatness	1						
Subtotal	19			3			
Total	22						

Adapted from Lake County Schools DBQ Self-Score Sheet