



Question #1: Science

10 points

An **anomaloscope** [uh-NAHM-uh-loh-“scope”] tests for this condition by asking patients to match a rectangle they control to a fixed rectangle. Variants of this condition known as **protanopia** [PROH-tuh-NOH-pee-uh] and **deuteranopia** [DOO-tuh-ruh-NOH-pee-uh] are sex-linked and more common in males. A form of this condition caused by one type of cone being missing is called Daltonism. This condition can be detected using an **Ishihara** [ish-ee-HAHR-uh] test, which uses plates with dots that form numbers. Name this condition that may lead to total **monochromatism** [mah-no-KROE-muh-tiz-im] or an inability to distinguish several shades of red and green.

colorblindness or being **color-blind** [do not accept or prompt on “blind(ness)”]

Question #2: Literature

10 points

The “Hiberno-” form of this language originated in Ireland and was rarely spoken. In this language, the word “**nefas**” [NAY-fahs] means “sinful act” and is unusual because it is unchanged by declensions. This language uses the suffix **-arum** [spell it out] for the singular accusative and plural genitive first declension. The “Vulgar” variety of this language is the ancestor of Romanian, Portuguese, and other languages. The abbreviations “e.g.” and “i.e.” stand for phrases in this language. Name this mostly-dead language from which French and Spanish are also descended, and which was spoken in ancient Rome.

Latin



Question #3: Social Studies

10 points

<p>A recent controversy surrounds whether a photograph of this person in the Marshall Islands was taken in 1935 or a few years later. This charter member of the Ninety-Nines wrote the books <i>The Fun of It</i> and <i>20 Hours 40 Minutes: Our Flight In The Friendship</i>, whose name refers to this person's trip with Wilmer Stultz from Newfoundland [NOO-fun-lund] to Wales in 1928. This person's trip with Fred Noonan from Papua New Guinea to Howland Island in 1937 was not completed, and she was never found. Name the first female aviator to fly solo across the Atlantic Ocean.</p>	<p>Amelia <u>Earhart</u></p>
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Question #4: Science

10 points

<p>If these particles have less than half of an electron-volt of energy, they are very efficiently absorbed by cadmium-113. On the other hand, californium-252 is commonly used as a source of these particles. This particle is changed into a proton, electron, and electron anti-neutrino in beta-minus decay. Adding one of these particles to uranium or plutonium causes a nuclear chain reaction. Mass number minus atomic number equals the number of these particles in an atom. Name these particles, discovered by James Chadwick, that exist with protons in atomic nuclei.</p>	<p><u>neutrons</u></p>
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Question #5: Miscellaneous

10 points

String musicians sometimes harden their fingertips with a substance of this type that is particularly fast-acting, **cyanoacrylate** [“SIGH”-uh-noh-AK-rih-“late”]. Another one of these substances comes in two parts—hardener and resin—that the user must mix, and is called epoxy. Yet other versions of this kind of substance are made from plant **mucilage** [MYOO-sih-luj] or from the hides of animals like horses. Name this type of substance that can be spread on two materials to stick them together.

glues [prompt on **adhesives**] (Cyanoacrylate is the generic name for Super Glue.)

Question #6: Literature

10 points

One poem by this author tells the title concept “You are the best friend / I ever had” and is titled “Good Morning Revolution”. Another work by this poet includes the parenthetical remark “America never was America to me.” This author of “Let America Be America Again” wrote of bathing in the **Euphrates** [“you-FRAY-tees”] and building a hut on the Congo in a work that states “My soul has grown deep”: “The Negro Speaks of Rivers”. This poet considers festering, crusting over, exploding, and drying up “like a raisin in the sun” as possible fates for a “dream deferred”. Name this Harlem Renaissance poet.

(James Mercer) Langston **Hughes**



Question #7: Mathematics

10 points per part

Consider the graph in three dimensions of the equation $2x$ plus $3y$ plus $6z$ equals 14 .		
1	What is the shape of the graph?	a <u>plane</u> or <u>planar</u>
2	What is the plane's x -intercept?	$x = \underline{7}$ or $(\underline{7}, \underline{0}, \underline{0})$
3	What is the smallest distance between the plane and the origin?	<u>2</u> units

Question #8: Mathematics

10 points per part

Consider the graph in two dimensions of the equation x squared over 25 , plus y squared over 16 , equals 1 .		
1	What shape is the graph of that equation?	<u>ellipse</u> [or <u>elliptical</u> ; prompt on <u>conic</u> section or <u>oval</u>]
2	Find the distance from the center to either focus of the ellipse.	<u>3</u> units
3	Find the area of the ellipse.	<u>20 pi</u> square units



Question #9: Social Studies

10 points per part

This country's newest seawater desalination [dee-SAL-ih-"nation"] plant will be in the city of Ashdod.		
1	Name this country between the Mediterranean Sea and the Dead Sea. Its National Water Carrier brings fresh water from its Golan [goh-LAHN] Heights to population centers like Tel Aviv [ah-VEEV].	(State of) Israel [or Medinat Yisra'el]
2	This desert comprises the southern half of Israel, stretching from Beersheba ["beer"-SHEH-bah] in the north to Eilat [ay-LAHT] on the Gulf of Aqaba [AH-kah-bah].	Negev Desert
3	This narrow "strip" of land separates the Negev from the Mediterranean Sea. It is a self-governing Palestinian territory.	Gaza Strip

Question #10: Social Studies

10 points per part

Give the following about the Kentucky Bend:		
1	It is completely surrounded by Tennessee and Missouri and disconnected from the rest of its state, making it this type of geographic region relative to Kentucky.	exclave
2	A meander in this river forms the Kentucky Bend. This river forms Missouri's east border.	Mississippi River
3	The Kentucky Bend is just south of this Missouri town, which shares its name with a faultline that produced a series of earthquakes in 1811 and 1812 so strong that the Mississippi River flowed backwards.	New Madrid [MAD-rid], Missouri



Question #11: Literature

10 points per part

This novel’s main character becomes a mayor while he is using the name “Monsieur Madeleine”.		
1	Name this novel about a character who spent 19 years in jail for stealing bread: Jean Valjean [zhahn val-zhahn].	<i>Les Misérables</i> [lay mee-zair-ahbl’] [or <i>The Miserable Ones</i> or <i>The Wretched Poor</i> ; do not accept or prompt on “Les Miz”]
2	This police officer pursues Valjean for much of the novel. This character also arrested Fantine [fan-teen].	Inspector Javert [zah-vair]
3	This daughter of Fantine works for the Thênardiers [tay-nard-yayz] until Valjean liberates her. She ultimately marries Marius Pontmercy [mah-ree-uss pawn-mair-see].	Cosette [koh-set]

Question #12: Literature

10 points per part

According to one science fiction author, these beings must follow three laws, the first of which is not harming humans.		
1	Give this term for human-like machines. The grandmother in Ray Bradbury’s “I Sing the Body Electric” is one of these machines.	robots [prompt on androids]
2	This Russian-American science fiction writer stated the three laws of robotics in his story “Runaround”, part of his <i>I, Robot</i> collection. This author also wrote the <i>Foundation</i> series.	Isaac Asimov [or Isaak Yudovich Ozimov]
3	This Czech author of <i>The War with the Newts</i> introduced the word “robot” in his play <i>R.U.R.</i>	Karel Čapek [“Carol” CHAH-pek]



Question #13: Science

10 points per part

One of the postulates of special relativity states that this value is the same for all observers.		
1	Identify this constant equal to about 3 times 10 to the 8 th meters per second.	<u>speed of light</u> in a vacuum or <u>c</u> -naught
2	This scientist died in 1931 while working with Francis Pease and Fred Pearson to improve measurements of the speed of light. He earlier failed to observe the ether with Edward Morley.	Albert <u>Michelson</u>
3	This paradox led to the discovery that information can travel faster than the speed of light via quantum entanglement.	<u>Einstein-Podolsky-Rosen</u> paradox or <u>EPR</u> paradox

Question #14: Science

10 points per part

Augustin-Jean Fresnel [oh-goo-stan zhahn freh-nel] adapted Huygens' [HOY-gunz'] principle from explaining refraction to explaining this phenomenon.		
1	Name this phenomenon in which a wave bends around an obstacle.	<u>diffraction</u> [or <u>diffracting</u>]
2	Fresnel combined Huygens' principle with this concept based on wave superposition. This phenomenon can be constructive or destructive.	wave <u>interference</u> [or <u>interfering</u> waves]
3	The type of diffraction named after this German scientist occurs when the image is far away from the obstacle.	Joseph von <u>Fraunhofer</u> [YOH-sef vawn FRAWN-haw-fur]



Question #15: Social Studies

10 points

When **Amanullah** [am-ah-NOO-lah] Khan fled this country, he left his brother in charge, but the brother quit after three days, saying he never wanted to be king. After ruling this country for 40 years, Mohammed Zahir Shah was overthrown by his cousin. At the end of 1979, the Soviet Union put Babrak Karmal in charge of this country at the beginning of an invasion that caused the United States to boycott the Olympics. The United States invaded this country in Operation Enduring Freedom about a month after 9/11. Name this country where Hamid Karzai took over when the Taliban was driven back.

(Islamic Republic of)
Afghanistan [or
Jomhuri-ye Eslami-ye
Afghanistan]

Question #16: Literature

10 points

At the end of this poem, the two main characters were “hand in hand” and “took their solitary way”. This poem states “What in me is dark illumine, what is low raise and support.” This poem makes that request so that “I may assert Eternal Providence, And justify the ways of God to men.” Some of this poem is set in Pandemonium, which is the capital of Hell. This poem begins “Of man’s first disobedience, and the fruit of that forbidden tree”. Name this 17th-century English poem whose main characters are Satan, Adam, and Eve that was written by John Milton.

Paradise Lost



Question #17: Mathematics

10 points

A conic written in general form is a hyperbola if its discriminant is this type of number. The **signum** [SIG-num] of these numbers equals one. If the second derivative of a function is one of these numbers, then the first derivative is increasing, and the function is concave up. All of the trigonometric functions output these numbers in the first quadrant, and on the unit circle these numbers measure angles generated by counterclockwise rotations. If the discriminant of a quadratic polynomial is one of these numbers, then its graph has two x -intercepts. Give this term for a number greater than 0.

positive numbers or **positives** [accept **greater than 0** before “greater”; do not accept or prompt on answers mentioning “greater than or equal to 0”]

Question #18: Fine Arts

10 points

Lester Young primarily played clarinet and this instrument; he and pianist Bud Powell inspired the character Dale Turner in the movie *Round Midnight*, who was portrayed by Dexter Gordon, another performer on this instrument. The trumpeter Miles Davis had two people playing this instrument in his sextet, including “Cannonball” Adderley. The other Davis sextet member who played this instrument recorded *Giant Steps* and *A Love Supreme*, and was named John Coltrane. Name this reed instrument that is usually made of brass.

saxophone(s) [accept more specific answers]



Question #19: Science

10 points

Cheater bars are used to increase this quantity, and **epicyclic** [EP-uh-“sigh”-klik] gearing mechanisms are used in objects named for their ability to multiply this quantity. This quantity on a **dipole** [“DIE-pole”] equals the dipole moment crossed with the electric or magnetic field. Integrating this quantity with respect to angle gives work. In static equilibrium, both force and this quantity must have a net value of zero. This quantity equals both the derivative of angular momentum with respect to time [pause] and the cross product of position with force. When using a wrench, this quantity can be increased by using a longer handle. Name this rotational analog of force.

torque

Question #20: Social Studies

10 points

This thinker proposed that men were “prosthetic Gods” and that children had an “oceanic feeling” in one of his books. Another of this writer’s books developed Sabina **Spielrein’s** [SPEEL-“rain’s”] concept of *thanatos* [THAN-uh-tohss] as the death drive, contrasting with *eros* [“AIR”-ohss], or sexual drive. One case study published by this thinker told of Little Hans, who was afraid of horses, which this thinker connected to his theory of the **Oedipus** [ED-uh-pus] id, ego, and superego. Name this originator of psychoanalysis.

Sigmund **Freud** [or
Sigismund Schlomo **Freud**]



Question #21: Literature

10 points per part

The narrator of this novel falls in love with Fayaway.		
1	Identify this novel, based on the author's experience in the Marquesas [mar-KAY-suss] Islands, in which the narrator and Toby find themselves among cannibalistic natives at war with the Happers.	<i>Typee: A Peep at Polynesian Life</i>
2	Tommo and Toby find themselves among the Typee after a failed hunt for one of these animals. In another novel, one of these animals is sought by Ishmael and Ahab aboard the <i>Pequod</i> .	sperm <u>whales</u>
3	Both of those novels, <i>Typee</i> and <i>Moby-Dick</i> , were written by this author.	Herman <u>Melville</u>

Question #22: Literature

10 points per part

This play's protagonist sees its title object as a sign that she is pregnant.		
1	Name this play in which Serafina loses her husband Rosario. Serafina's daughter dates a sailor named Jack and ends up leaving for New Orleans after being attacked by Alvaro.	<i>The <u>Rose Tattoo</u></i>
2	In this other play by the same author, Stanley Kowalski attacks his sister-in-law, Blanche DuBois, who had "always depended on the kindness of strangers".	<i>A <u>Streetcar Named Desire</u></i>
3	This playwright wrote <i>The Rose Tattoo</i> and <i>A Streetcar Named Desire</i> .	(Thomas Lanier) "Tennessee" <u>Williams</u> (III)



Question #23: Science

10 points per part

Rocks are often divided into three major types based on how they form.		
1	Bowen's reaction series describes the formation of this type of rock in terms of the crystallization of magma as it cools.	igneous [IG-nee-uss] rock
2	The bottom of Bowen's reaction series is this mineral made of silicon dioxide. It is found in igneous rocks such as granite, as well as in sedimentary rocks like sandstone.	quartz
3	Metamorphic rocks are formed by changes from an original rock. That original rock is known by this name.	protolith(s)

Question #24: Science

10 points per part

Hurricanes may slow down and strengthen due to a series of wall replacement cycles.		
1	The walls form around the center of the hurricane, which is clear of clouds, usually has calm weather, and is known by this term.	eye
2	Eyewall replacement generally only happens with wind speed greater than 110 miles per hour, which means the hurricane must be rated at least a 3 on this scale.	Saffir-Simpson hurricane wind scale [accept or SSHWS]
3	This is the region between the original and replacement eyewall.	moat



Question #25: Social Studies

10 points per part

In 1951, a Seventeen-Point Agreement gave China sovereignty over this region.		
1	Name this region whose spiritual leader is the Dalai Lama.	<u>Tibet</u> (Autonomous Region)
2	During the past decade, several Tibetan monks have taken this action to protest China. This form of protest was also used by Mohamed Bouazizi [boo-ah-ZEE-zee] in 2011 in Tunisia and Thich Quang Duc [thich kwang duk] in 1963 in Vietnam.	self- <u>immolation</u> [accept any descriptive answer indicating setting <u>themselves</u> on <u>fire</u> or <u>burning themselves</u> ; prompt on <u>suicide</u>]
3	Tibet temporarily became independent following the collapse of this Chinese dynasty in 1912.	<u>Manchu</u> dynasty or (Great) <u>Qing</u> dynasty

Question #26: Social Studies

10 points per part

Because of its origin, this empire was also known as the Eastern Roman Empire.		
1	Name this empire whose first ruler was Constantine [“CON-stun-teen”] the Great. Its final ruler, Constantine XI [11], was killed by the Ottomans in 1453.	<u>Byzantine</u> Empire
2	This person was the Byzantine emperor from 527 to 565. He ordered the construction of the Hagia Sophia [“HI”-ah soh-FEE-ah].	<u>Justinian I</u> or <u>Justinian the Great</u> [prompt on <u>Justinian</u>]
3	This general under Justinian helped expand the empire by defeating the Sassanids [suh-SAH-nidz] at Dara and the Vandals at Ad Decimum [ad DESS-ih-mum].	Flavius <u>Belisarius</u> [FLAH-vee-ooss beh-lih-SAR-ee-uss]



Question #27: Fine Arts

10 points per part

This German composer's work with the violinist Ede Reményi [ED-eh reh-MEEN-yee] eventually led to this composer's <i>Hungarian Dances</i> .		
1	Name this composer whose "Good evening, good night" is a popular lullaby.	Johannes Brahms
2	Brahms wrote two pieces he classified as this type of work in the summer of 1880, the <i>Tragic</i> and the <i>Academic Festival</i> .	(concert) overtures
3	This composer changed a common perspective on Brahms by writing the essay "Brahms the Progressive". This composer also wrote the book <i>Theory of Harmony</i> and the string sextet "Transfigured Night".	Arnold (Franz Walter) Schoenberg [shern-berg]

Question #28: Fine Arts

10 points per part

The Hector Berlioz [bair-lee-ohz] composition of this type is called <i>Grande Messe des morts</i> [grahnd mess deh mort].		
1	Give this term for a mass for the dead.	requiem (s)
2	Berlioz also wrote this program symphony whose last two parts are "March to the Scaffold" and "Dream of the Night of the Sabbath".	<i>Symphonie fantastique</i>
3	This is Berlioz's second symphony. It is subtitled <i>Symphony in Four Parts with Viola Obbligato</i> , and it is based on a work by Lord Byron.	<i>Harold in Italy</i> or <i>Harold en Italie</i>



Question #29: Science

10 points

<p>If these events occur too often, there is an error catastrophe. Motoo Kimura and James Crow developed the infinite alleles [uh-LEELZ] model to study these events, which was developed into a stepwise model. Hermann Joseph Muller classified these events as types of morphs, building on the work of Hugo de Vries. The Hardy-Weinberg principle assumes that selection, migration, and these events do not occur. These events can be classified as substitutions, insertions, deletions, and frame shifts. Give this term for a change in a genome.</p>	<p>mutations [or mutating or mutate]</p>
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Question #30: Social Studies

10 points

<p>This document appeals to, quote, “the Supreme Judge of the world for the rectitude of our intentions”. This document was printed by Mary Katherine Goddard about six months after John Dunlap printed it. The biggest change from the draft to the final documents was the removal of a paragraph mentioning slavery. Roger Sherman and Robert Livingston served on the Committee of Five that drafted this document, whose second paragraph begins “We hold these truths to be self-evident, that all men are created equal.” Name this document drafted by Thomas Jefferson that was approved on July 4, 1776.</p>	<p>United States <u>Declaration of Independence</u></p>
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Question #31: Literature

10 points

<p>This character's daughter is abducted while trying to redeem him for trespassing on land sacred to the Furies. This man dies after failing to prevent a war between Polynices [pah-lee-NY-seez] and Eteocles [eh-TEE-oh-kleez]. This character gives the answer "man" to a question about walking on four legs, then two, and finally three. This protagonist spends his last days in Colonus [koh-LOH-nuss]. This character learns that he murdered his father, Laius ["LIE-us"], from the seer Tiresias ["tie"-REE-see-uss]. This king of Thebes blinds himself in a play by Sophocles [SAH-foh-kleez]. Name this king of Thebes [theebz] who marries Jocasta [yoh-KAH-stah], who is also his mother.</p>	<p><u>Oedipus</u></p>
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Question #32: Mathematics

10 points

<p>The value of this function gives the y-coordinate where a ray from the origin intersects the line $x = 1$. This function of theta over 2 always equals the cosecant of theta times the quantity 1 minus the cosine of theta. An antiderivative of this function is the opposite of the natural log of the absolute value of the cosine function, and the derivative of this function is the secant function squared. Name this trigonometric function equal to y divided by x on the unit circle, and equal to "opposite over adjacent" in a right triangle.</p>	<p><u>tangent</u> [accept answers that additionally mention a variable]</p>
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Extra Question #1: Social Studies

10 points

The army from this location brought chains, which their enemy used on them, to the Battle of the Fetters. The army from this location used bribery to win the Battle of the Great Foss during the Second Messenian [meh-SEE-nee-un] War, and was badly defeated by Epaminondas [EP-uh-mih-NAHN-duss]—who fought for the Boeotian [bee-OH-shun] League—at the Battle of Leuctra [LOOK-truh]. This location’s oral Constitution was called the Great Rhetra and was credited to Lycurgus [ly-KUR-gus]. Name this city-state that was led into the Battle of Thermopylae [ther-MAH-puh-lay] by Leonidas [lee-AH-nih-duss] and was known for its emphasis on military fitness.

Sparta or Spartan

Extra Question #2: Mathematics

10 points

Cantor’s theorem about this operation states that the result is nonempty when this operation is applied to non-empty nested compact subsets. If A and B are sets, then the set “ A minus B ” is calculated by removing from A any element in the result of this operation on A and B . On a Venn diagram, this operation is represented by the overlapping section. De Morgan’s laws relate complement, union, and this operation. Name this operation on sets whose result is the elements in *both* input sets.

intersection [prompt on and or conjunction]



Extra Question #3: Science

10 points

<p>Polynyas [puh-LIN-yuz] are areas free of this substance at regular intervals, while leads [leeds] are only free of this substance at sporadic times and locations. Rime is a thin layer of this substance that forms on foggy nights. This substance can cause a type of weathering called cryofracturing [“CRY-oh-fracturing”]. Calving is the process of pieces of this substance breaking off into the ocean. Name this frozen substance that makes up sleet, hail, and glaciers.</p>	<p><u>ice</u></p>
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Extra Question #4: Fine Arts

10 points

<p>The second act of this opera begins with a song about the sound of an ancient instrument called a sistrum, “Les tringles des sistres tintaient [lah treen-gul deh sees-tray ”teen-tie-on“]”. Many arias in this opera have nicknames such as “the Card Song”, in which the title character sings about predictions of her death, and another aria’s nickname comes from the title character boasting that she will dance the seguidilla [say-gee-dee-yah]. The title character’s aria whose name means “Love is a rebellious bird” is nicknamed “Habanera”, and “Votre toast” is called its “Toreador Song”. Name this opera about a gypsy, composed by Georges Bizet [zhorzh bee-zay].</p>	<p><u>Carmen</u></p>
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Extra Question #5: Literature

10 points

A character in this play states “Let us be sacrificers, but not butchers” and then adds “Let’s carve him as a dish fit for the gods, / Not hew him as a carcass fit for hounds.” Later in this play, the words “Liberty! Freedom! Tyranny is dead!” are yelled by **Cinna [KIN-nuh]**. A speech in this play beginning “Friends, Romans, countrymen, lend me your ears” is given by Antony, who turns an enraged crowd against Brutus and Cassius. Name this William Shakespeare play in which the words “Et tu, **Brute [broo-TAY]?**” are spoken by the title Roman leader as he is assassinated.

*The Tragedy of **Julius Caesar***



Extra Question #6: Mathematics

10 points per part

When tables were used instead of calculators, this angle was used to look up sine and cosine values for the original angle.		
1	Give this term for the “reduced form” of an angle, equal to its distance from the x -axis and always between 0° and 90° .	reference angle(s)
2	This term refers to two angles that have the same initial and terminal directions, meaning that their measures differ by a multiple of 360 degrees.	coterminal angle(s)
3	Find the reference angle for 210° .	30 degrees

Extra Question #7: Mathematics

10 points per part

If a good statistical model is used, there is no pattern in these values.		
1	Give this term for the difference between an observed value and the value predicted by a model such as a line of best fit.	residual [prompt on error]
2	A good statistical model also leads to a high value for the square of coefficients of this factor, such as Pearson’s r .	(product-moment) correlation coefficient
3	This is the value of the Pearson correlation coefficient if there is a linear regression on two points that slope downward.	-1



Extra Question #8: Social Studies

10 points per part

The land that became this state was purchased for about seven million dollars in 1867.		
1	Name this state whose purchase was nicknamed “Seward’s Folly”.	<u>Alaska</u>
2	William Seward held this position when he negotiated the purchase of Alaska.	U.S. <u>Secretary of State</u>
3	This Alaskan city was started soon after the so-called “Three Lucky Swedes” found gold near Anvil Creek in 1898, a few years after Dawson City was built up during the Klondike Gold Rush.	<u>Nome</u> , Alaska

Extra Question #9: Social Studies

10 points per part

A crisis in this country led to the creation of the show <i>America Held Hostage</i> , which later became <i>Nightline</i> .		
1	Name this country in which the U.S. embassy was taken over in 1979. Hostages from there were held for over a year.	(Islamic Republic of) <u>Iran</u>
2	The hostage crisis made this U.S. president look weak, contributing to his loss to Ronald Reagan in the 1980 election.	(James Earl) “Jimmy” <u>Carter</u> (Jr.)
3	This U.S. National Security Advisor pushed for a military solution to the conflict, but the attempted one failed when some helicopters crashed.	Zbigniew <u>Brzezinski</u> [z'-BIN-yef bur-ZIN-skee]