Tossup 1: Social Studies — Geography

It contains the Seven Summits, in which Uhuru Peak, its highest point, is located. There are many volcanoes near it, like that of Kibo and Mawensi. Surrounded mostly by grasslands, it is located in Tanzania, and barley and sugar is produced here. Name this mountain, the tallest in Africa.	**Mt. Kilimanjaro**

Bonus 1: Literature — Literature

	Identify the following title character or characters.	
A	He drives his wife to Waterbury to buy puppy biscuit and drops her off at the beauty salon, and daydreams in between errands in a story by James Thurber.	**Walter Mitty**
B	In a play by Aristophanes, Pisthetaerus *(pihs-theh-TI-ruhs)* convinces them that they are superior to the gods, and proposes the creation of Cloudcuckooland.	**The Birds**
C	A lower-class man who dreams of becoming a scholar eventually has children with his cousin, and later one of those children murders his siblings and hangs himself.	**Jude** "The Obscure" **Fawley** *(prompt on last name)*
D	A servant girl of Lady B, Mr. B keeps this Samuel Richardson title character prisoner at his country estate, but the two marry and she turns Mr. B into an honest husband.	**Pamela** Andrews *(prompt on last name)*

Tossup 2: Math — Calculus (Computational: 30 Seconds)

Find the definite integral of x times the natural log of x, from x equals 0 to 2.	**2 natural log of 2, - 1**

Bonus 2: Science — Astronomy

	Name these types of stars.	
A	This is a rapidly-rotating neutron star which emits strong radiation at very regular intervals.	**Pulsar**
B	This is the final form of any star whose mass is under the Chandrasekhar limit. They are thought to turn darker after enough time, but none have been around long enough.	**White dwarf**
C	In about five billion years, the sun will turn into this very large type of star, after it runs out of hydrogen in its core and begins fusing outside of its core.	**Red giant**
D	This is a system of two stars whose center of mass is outside both of the stars, causing them to orbit each other.	**Binary star**

Tossup 3: Literature — Literature

His first novel, Summer Crossing, was not published until 2005 on account of it being stolen by a housesitter he hired in 1966. A controversial photograph of him on the dust jacket of his novel Other Voices, Other Rooms caught him reclining, while dreamily looking into the camera. Some found it suggestive, while others, like Andy Warhol, found it captivating. A friend and neighbor of Harper Lee, and a model for the character of Dill in To Kill A Mockingbird, identify this author of Breakfast at Tiffany's and In Cold Blood.	**Truman <u>Capote</u>**

Bonus 3: Social Studies — U.S. History

	Henry Clay unsuccessfully ran for President five times. Correctly answer the following about his campaigns.	
A	In 1840, Clay lost the Whig nomination to this hero from the battle of Tippecanoe.	**<u>William Henry</u> <u>Harrison</u>**
B	When Clay ran in 1832 against Andrew Jackson, the main issue was this system, created by James Madison.	**Second <u>Bank of the United States</u>** *(accept <u>National Bank</u>)*
C	As Speaker of the House, Clay convinced the House of Representatives to vote for John Quincy Adams in 1824; Adams in turn appointed Clay to this position.	**<u>Secretary of State</u>**
D	In 1844, Clay lost in New York by 5,000 votes, where many of Clay's supporters voted for this Liberty Party candidate.	**James Gillespie <u>Birney</u>**

Tossup 4: Science — Physics

This phenomenon is the only fundamental force of nature whose gauge boson has not yet been observed, and most Grand Unified Theories attempt to unify it with the other four fundamental forces. In general relativity, this is explained as the curvature of space-time. First explained in 1687 by Newton, this inverse-square phenomenon is, unlike electromagnetism, only attractive. Name this force by which masses attract each other, which causes objects to fall down.	**Gravity** *(accept universal gravitation)*

Bonus 4: Literature — Mythology

	Identify the following about mythological punishments.	
A	This mythological fire-bringer was chained to a rock and had his liver pecked out by an eagle on a daily basis.	**Prometheus**
B	This first king of Corinth was punished by having to roll a boulder up a hill, only to have it roll back down before he was able to get to the top.	**Sisyphus**
C	After cooking up his son Pelops and serving him to the gods, he is punished by having a branch of fruit above him and a pool of water below him, neither of which he can reach.	**Tantalus**
D	He got frisky with a cloud version of Hera, and was punished by being lashed to a forever-spinning wheel of fire.	**Ixion**

Tossup 5: Social Studies — Other

Created in part by using the ceteris paribus *(seh-tar-iss par-ee-boos)* principle, it is impossible to produce outside of this unless trading with another party occurs. If a point is on the inside of it, then resources are being misallocated, while a tradeoff is required to move along it. Allocative efficiency occurs at the most preferable point on it, which is when marginal benefit equals marginal cost. Identify this graph that illustrates how goods and services can be efficiently produced.	**Production Possibilities Frontier** *(prompt PPF)*

Bonus 5: Math — General

	Name these Fundamental Theorems.	
A	This theorem states that every natural number has exactly one prime factorization.	**Fundamental Theorem of Arithmetic**
B	This theorem states that every polynomial with complex coefficients has at least one complex root.	**Fundamental Theorem of Algebra**
C	This theorem has two parts, stating that integrals and derivatives are inverses, and that definite integrals can be found using indefinite integrals.	**Fundamental Theorem of Calculus**
D	This theorem states that the namesake objects can be completely described by their curvature and torsion.	**Fundamental Theorem of Curves**

Tossup 6: Fine Arts — Visual Art

This painter depicted himself wearing a green jacket and smoking the title object in Man With a Pipe. A young boy carries a basket of rocks being shattered by an old man holding a hammer in his painting The Stone Breakers. A nude model and a young boy watch him working on a landscape in his painting of his studio, while another of his paintings includes a line of mourning women wearing black, as well as a coffin being carried into a grave in the foreground. Identify this French realist painter best known for Burial at Ornans.	**Gustave Courbet**

Bonus 6: Science — Chemistry

	Identify these laws that govern how electrons fill up orbitals.	
A	This principle named after the German for "construction" states that electrons fill orbitals starting at the lowest-energy orbitals.	**Aufbau principle**
B	Also called the "bus-seat" rule, this rule states that electrons enter empty orbitals of equal energy before doubling up.	**Hund('s) rule of maximum multiplicity**
C	This principle states that two electrons cannot be in the same quantum state in the same atom.	**Pauli exclusion principle**
D	These rules are sometimes broken by this kind of metal, located in the d block of the periodic table.	**Transition metals**

Tossup 7: Science — Biology

One example of the auto- variety is a coloration on the back of an owl's head looking like its eyes. Some instances are considered mutualistic, as in the Mullerian variety, where two harmful species avoid predation by sharing warning signs. The Batesian variety, however, is not mutualistic, as a harmless species benefits by looking like a dangerous species. Name this biological phenomenon in which one organism looks like another organism.	**Mimicry**

Bonus 7: Social Studies — World History

	Identify these facts related to the end of the reign of James II.	
A	James was overthrown during this 1688 Revolution.	**Glorious Revolution** *(prompt on Bloodless Revolution; do not accept English Civil War or Revolution)*
B	James was replaced by his daughter Mary and this man, her Dutch husband.	**William of Orange** *(prompt on William; accept William III)*
C	The answer to part two defeated James at this 1690 battle, where James attempted to regain the throne.	**Battle of the Boyne**
D	After his exile from England, James was protected by this European monarch.	**Louis XIV**

Tossup 8: Miscellaneous — Sports

It was invented by the Montréal Canadiens in the 1950s, and today is primarily used as a way to measure a player's defensive capability. The statistic increases by one every time the player is on the ice and his team scores a non-power play goal, and decreases by one every time that player is on the ice, and the opposing team scores a non-short-handed goal. Identify this statistic, unique to ice hockey, often called a ratio, even though it is really a sum and difference.	**Plus/Minus** *(accept Plus and minus)*

Bonus 8: Fine Arts — Music

	Identify the following about Felix Mendelssohn.	
A	In 1829, he conducted a revival of the St. Matthew Passion of this composer, who died in 1750.	**Johann Sebastian Bach**
B	This oratorio was inspired by the composer in part A, as well as Handel. It tells the story of a Biblical prophet, and was premiered in English for the Birmingham Festival.	**Elijah**
C	His most famous work today may be his overture and incidental music to a production of this Shakespearean play.	A **Midsummer Night's Dream**
D	This symphony was composed for the three hundredth anniversary of Martin Luther's Augsburg Confession, but was possibly published only after Mendelssohn's death.	**Symphony No. 5** or The **Reformation Symphony**

Tossup 9: Math — Geometry (Computational: 30 Seconds)

Find the volume of an ellipsoid whose semi-axes are 3, 4, and 6.	**96 pi**

Bonus 9: Science — Biology

	Identify these terms related to photosynthesis.	
A	Enzymes required for photosynthesis are embedded in the membranes of these pancake-like structures within chloroplasts of cells.	**Thylakoids**
B	This enzyme is the most abundant protein on Earth, and helps perform the first stages of carbon fixation.	**Rubisco**
C	These are the pores in leaves through which water vapor, oxygen, and carbon dioxide can pass.	**Stoma**(ta)
D	Pineapples and cacti use this photosynthesis pathway which can store carbon dioxide for later use, allowing them to close their pores during the day.	**CAM** *(accept crassulacean acid metabolism)*

Tossup 10: Literature — Literature

Featuring a dramatis personae of some four-hundred characters, this work, for the most part, identifies characters not by name, but by their station or by a title. Recounting the life of a son of a Japanese emperor who, for political reasons, is relegated to commoner status, identify this work that may have been the first novel, written by Lady Murasaki Shikibu.	**The <u>Tale</u>(s) <u>of Genji</u>** *(accept Genji Monogatari)*

Bonus 10: Miscellaneous — Entertainment

	Identify these facts related to the ABC Family show Greek.	
A	The show is set at this fictional school.	**<u>Cyprus-Rhodes</u> University** *(accept CRU)*
B	The actress who plays Casey Cartwright is the daughter of this actor known for his role as Frasier.	**Allen Kelsey <u>Grammer</u>**
C	Jessica Lee Rose, the actress who plays Jen K, is better known for starring as a depressed teenager named Bree in this YouTube series.	**<u>Lonelygirl15</u>**
D	This band has appeared on the show and performed their songs Our Time Now and Hey There, Delilah.	**<u>Plain White T's</u>**

END OF FIRST HALF – 2 minute timeout

Tossup 11: Literature — Literature

In this work, a distinction is made between a male duck and the female of the same animal, a duchess. The main character seeks refuge for his wasteful son, who is found napping at the beginning of the play. That character, Strepsiades, meets a certain philosopher hoisted above his pupils at the Thinkery, a school that teaches both traditional and immoral logic. Name this Aristophanes play parodying Sophism and featuring Socrates and a chorus of the titular weather gods.	The **Clouds**

Bonus 11: Social Studies — U.S. History

	Identify these people related to the Presidency of Franklin Delano Roosevelt.	
A	This second Vice President of FDR's later ran for president in 1948.	**Henry Agard Wallace**
B	This woman who served during FDR's presidency was the first female member of the cabinet, where she was the Secretary of Labor.	**Frances Coralie Perkins** *(accept Fanny Coralie Perkins)*
C	This man was FDR's first Vice President.	**John Nance Garner** IV
D	This Missourian assumed the presidency upon FDR's death.	**Harry S. Truman**

Tossup 12: Science — Chemistry

First developed by Linus Pauling, this molecular tool can be represented graphically in organic chemistry through arrow-pushing. While it resembles tautomerization, these structures do not exist independently, but rather average out to the actual structure of a molecule. Indicating fractional bond order and charge delocalization, molecules exhibiting this show unusual stability. First observed in benzene, name this technique in which multiple Lewis structures are drawn to characterize a single molecule.	**Resonance** structures

Bonus 12: Math — Geometry

	Identify the following triangle centers.	
A	This is the center of the circle circumscribed about the triangle.	**Circumcenter**
B	This is the intersection of the altitudes of the triangle.	**Orthocenter**
C	This is the intersection of the angle bisectors of the triangle.	**Incenter**
D	This is the intersection of the medians of the triangle.	**Centroid**

Tossup 13: Social Studies — World History

After nearly being struck by lightning, this man promised to become a monk. As he studied the Bible, this man came to believe that the Catholic church had become corrupt and challenged the then-common practice of selling indulgences. On October 31, he undertook a course of action that sparked a reformation, and was excommunicated five years later. Name this man, who nailed 95 theses to the door a church in Wittenberg.	**Martin Luther**

Bonus 13: Literature — Literature

	Identify the following genres of literature.	
A	A work that describes real-life events under the guise of fiction.	**Roman à clef** *(accept Roman à clé)*
B	A German term used for describing a "coming of age" work.	**Bildungsroman**
C	Lengthy, revered narrative poetry that usually begins in medias res.	**Epic** poetry
D	A specific type of work in which plot and action are more emphasized than characters.	**Melodrama**

Tossup 14: Math — General

For a vector space, it is equal to the number of vectors in a basis. In topology, it refers to which Euclidean space a connected manifold is homologous. In physics, it refers to the units accompanying a quantity. For fractals, the Hausdorff variety extends the normal definition to non-counting numbers. In general, however, this refers to the number of degrees of freedom that a space has. Identify this term that is one for a line, two for a plane, and three for normal space.	**Dimension**

Bonus 14: Miscellaneous — Sports

	Identify these baseball players who have come over from Japan.	
A	This pitcher, the second ever to come over to the big leagues, spent most of his career with the LA Dodgers.	**Hideo Nomo**
B	In 2001, this Seattle Mariner became the second player ever to win both the Rookie of the Year and MVP awards in the same season.	**Ichiro Suzuki** *(accept either half of name)*
C	This Yankees outfielder is known as "Godzilla."	**Hideki Matsui**
D	This Boston Red Sox starting pitcher made his Major League debut in 2007 by striking out 10 Kansas City Royals batters.	**Daisuke Matsuzaka**

Tossup 15: Fine Arts — Music

Mathematically, it occurs when two notes are played with frequencies in the ratio of the square root of two to one. Formed by using the fourth and seventh pitches of a major scale, it is created by two pitches six half-steps apart. Name this interval also called an augmented fourth or diminished fifth.	**Tritone** *(accept Augmented Fourth or Diminished Fifth before they are mentioned)*

Bonus 15: Social Studies — Geography

	Identify these island groups.	
A	The largest city of this island nation is Auckland.	**New Zealand**
B	These islands belonging to Spain are near Africa, and one of its capitals is Santa Cruz de Tenerife.	**Canary** Islands *(accept Islas Canarias)*
C	There was a war fought over these islands in the 1980s between Britain and Argentina.	**Falkland** Islands *(accept Islas Malvinas)*
D	Ponta Delgada is the largest city in these islands owned by Portugal that are almost halfway between Europe and North America.	**Azores**

Tossup 16: Social Studies — U.S. History

Written by a Pennsylvania Democrat, this clause appeared in two bills, although it would not pass in either. It first appeared in a bill called the "Two Million Dollar Bill," the amount referring to the United States' monetary compensation to Mexico for territories lost in war. Voting on it marked the first time Congress voted along regional, rather than party, lines. Name this defeated proposal, which stated slavery would be illegal in all lands acquired in the Mexican-American War.	**Wilmot Proviso**

Bonus 16: Math — Other

Given the set of numbers 1 1 2 5 8 10, find the following.	
A The mean of the set.	**9/2**
B The mode of the set.	**1**
C The median of the set.	**7/2**
D The standard deviation of the set.	**7/10 root 30** *(accept 7 root 30 / 10)*

Tossup 17: Miscellaneous — Entertainment

In late 2007, doctor Jan Adams came under fire for surgery he performed on this artist's mother, as she died the next day. The owner of GOOD Music, he is known to make controversial statements, including those made while co-hosting a Katrina benefit event with Mike Myers. Name this rapper whose first album was The College Dropout and featured Daft Punk on his 2007 hit Stronger.	**Kanye West**

Bonus 17: Literature — Literature

	Answer the following questions having to do with 19th century poets given the following information.	
A	Born in Portland, Maine, he created such works as "Evangeline" and "The Song of Hiawatha."	**Henry Wadsworth Longfellow**
B	He was given his first chance at writing by William Lloyd Garrison, and was elected to the Massachusetts state legislature in 1835. It wasn't until 1866 that he penned his masterpiece, "Snowbound."	**John Greenleaf Whittier**
C	A physician and poet, he shares his name with his son, a US Supreme Court Justice. He is famous for coining the term 'anesthesia' and writing "The Chambered Nautilus."	**Oliver Wendell Holmes Sr.**
D	Give the name of the Boston group of poets that, along with James Russell Lowell, the men in parts A through C are associated with.	**The Fireside Poets**

Tossup 18: Math — Calculus (Computational: 30 Seconds)

Find dy over dx at x equals negative pi, for the function y equals the quantity x cubed plus sine of x, all over cosine of x.	**1 - 3 pi squared**

Bonus 18: Science — Physics

	Name these laws related to electric circuits.	
A	This law states that voltage is equal to current times resistance.	**Ohm('s) Law**
B	Kirchhoff's junction law states that the sum of all of this quantity entering a junction is equal to the sum of all of them leaving the junction.	**Electric current**
C	Kirchhoff's second law states that this must sum up to zero when traveling in a loop around a circuit.	**Voltage**
D	This theorem states that any combination of resistors, voltage sources, and current sources can be reduced to a single current source in parallel with a resistor.	**Norton('s) theorem**

Tossup 19: Literature — Literature

This novel's title is derived from Bunyan's Pilgrim's Progress. At the novel's conclusion, Joseph Sedley dies of a mysterious illness, though considering the author's own illustrations that accompany the text, one might guess that he was in fact poisoned. Subtitled "A Novel without a hero", identify this novel that features Amelia Sedley and Becky Sharp as main characters, written by William Makepeace Thackeray.	**Vanity Fair**

Bonus 19: Fine Arts — Visual Art

	Identify the architects of the following buildings.	
A	The White House	**James Hoban**
B	Wainwright Building in St. Louis	**Louis Sullivan**
C	German Pavilion for the 1929 International Exposition in Barcelona	**Ludwig Mies van der Rohe**
D	The dome of Santa Maria del Fiore	**Filippo Brunelleschi**

Tossup 20: Science — Astronomy

They are categorized by their presence or lack of angular momentum and electric charge, two of their three independent properties, according to the "no-hair theorem." The only way they are known to form is through collapse of a star whose mass exceeds about three solar masses, and some theories believe they can evaporate if they emit enough Hawking radiation. Name this type of region whose name comes from the fact that not even light can escape their event horizons.	**Black hole**

Bonus 20: Math — Algebra

	Answer the following about the complex number 15 + 8 i. Give all complex answers in the form a + b i.	
A	What is its complex modulus?	**17**
B	What is its multiplicative inverse?	**15/289 - 8/289 i**
C	What is its complex conjugate?	**15 - 8 i**
D	What is it divided by 3 + 4 i?	**77/25 - 36/25 i**

END OF MATCH

Tossup A: Math — Algebra (Computational: 30 Seconds)

Find the product of the three roots of x cubed plus x squared minus 9 x minus 9 equals zero.	**9**

Bonus A: Social Studies — Current Events

	Given a description, identify the Republican candidate for the 2008 Presidential election.	
A	This man was the Mayor of New York City during the September 11th Attacks.	**Rudolph William Louis "Rudy" Giuliani**
B	This man was the Governor of Arkansas from 1996-2007.	**Michael Dale "Mike" Huckabee**
C	This Arizona senator ran in the 2000 election and was a POW in the Vietnam War.	**John Sidney McCain III**
D	This Congressman representing Texas' 14th district is considered a Libertarian.	**Ronald Ernest "Ron" Paul**

Tossup B: Literature — Mythology

If the Greek gods were real, this one would have been particularly angry after her great temple at Ephesus was burned to the ground by Herostratus. To make matters worse, the the man in question committed the act of arson so he might be known forever to history for his action. Name this Greek goddess whose temple was one of the seven wonders of the ancient world until its destruction in 356 B.C.	**Artemis**

Bonus B: Science — Biology

	Answer these questions about fungi.	
A	This is the study of fungi.	**Mycology**
B	Fungi grow long branching structures called these, which combine to form a large structure called a mycelium.	**Hyphae**
C	The bottom of most mushroom caps have little ribs called lamellae, or this, after a similar-looking structure in fish.	**Gills**
D	From the Greek for "fungus roots," this is a symbiotic relationship formed by fungi growing around plant roots.	**Mycorrhyzae**

Tossup C: Fine Arts — Music

It derives its text from Martin Luther's Bible, and opens with the movement "Blessed are they that mourn, for they shall be comforted." It may have been inspired by the death of the composer's mother or of Robert Schumann, and in a diversion from the traditional Latin mass, it omits the Dies Irae *(DEE-ace EE-ray)* and other mention of the last judgment. Identify this work in seven movements for chorus and orchestra, the longest composition of Johannes Brahms.	**German Requiem** *(accept Ein deutsches Requiem)*

Bonus C: Math — Calculus

	Find the area bounded by the line y = x and each of the following functions.	
A	y = x squared.	**1/6**
B	y = x to the fourth power.	**3/10**
C	y = x squared minus 3 x plus 3.	**4/3**
D	y = negative two x squared.	**5/24**

Tossup D: Social Studies — World History

During his rule, he was publicly lauded for policies favorable to the poor, and for making peace with the Parthians in Armenia. The Stoic philosopher Seneca was a key advisor to him and battled with this man's mother, Agrippina, for influence over him. Name this Roman Emperor who, according to the historian Tacitus played his Lyre during the Great Fire, and following the burning of Rome, built his Golden House.	**Nero**

Bonus D: Literature — Language Arts

Identify the following types of poetic feet.	
A One stressed followed by and unstressed syllable.	**Iamb**
B One unstressed followed by two stressed syllables.	**Dactyl**
C Two unstressed followed by one stressed syllable.	**Anapest**
D One stressed followed by one unstressed syllable.	**Trochee**

Tossup E: Science — Physics

Their acronym was coined by inventor Gordon Gould in 1959, though the patent for this device went to Bell Labs. They contain a pump source which powers the device, and an optical resonator which allows light to pass through the gain medium several times before exiting. Name this device with a five-letter acronym name, that emits beams of coherent light, and is used in optical disc drives, and handheld pointers.	**Laser** *(do not accept maser)*

Bonus E: Miscellaneous — Sports

	Identify the television network given a description.	
A	This cable channel broadcasts Monday Night Football games.	**ESPN**
B	John Madden and Al Michaels are the commentators for the Sunday night games on this network.	**NBC**
C	Any time an NFC plays an away game on a Sunday afternoon, the game will be broadcast on this channel.	**FOX**
D	This network broadcasts Thursday night games.	**NFL** Network