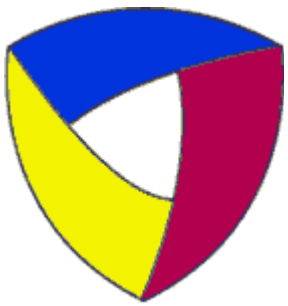


Ægis Questions

11th IHSSBCA Kickoff, 2006
Round 1

Tossup 1: Fine Arts (Music)
Despite claims that it was impossible, Ross Gorman was the first to perform its opening passage, needing a special reed to do so. The bandleader Paul Whiteman left the composer only five weeks to write it before its 1924 debut, at which he improvised the piano part. Name this work orchestrated by Ferde Grofé *(FAIR-dee gro-FAY)* and written by George Gershwin, that begins with a clarinet glissando.
Answer: **Rhapsody in Blue**

Bonus 1: Math (Calculus)
Find the slope of the following functions at x equals zero.
A: 3x squared minus 11x plus 4.
B: 3 sine of x.
C: 11x cubed plus 20x squared plus x plus 6.
D: 5x plus 2.
Answers: A: **-11** B: **3** C: **1** D: **5**

Tossup 2: Literature (Literature)
Also a creator of chess puzzles and an accomplished lepidopterist *(lep-i-DOP-tur-ist)*, he is mainly known as an author. His longest novel is Ada, though he is better known for his memoir "Speak, Memory," and his critical translation of Pushkin's "Eugene Onegin *(oh-NYAY-gin)*." Name this Russian author of Pale Fire and Lolita.
Answer: **Vladimir Nabokov**

Bonus 2: Science (Chemistry)
Answer these related questions about a standard laboratory procedure in chemistry.
A: Also known as volumetric analysis, this procedure can determine the concentration of an acid by adding base until it is neutralized.
B: This equipment is usually used to add the base, a vertical cylinder that allows for very accurate dispensing of base.
C: In a graph of pH, every drop of base added will slightly increase the pH, until this point when the acid is neutralized and the pH experiences a large increase.
D: To figure out the concentration of the original acid, you must know that the molarity of the acid and base are not necessarily the same. Instead, this quantity is the same, equal to the moles of hydrogen or hydroxide ions released by each.
Answers: A: **Acid-base titration** B: **Burette** C: **Equivalence point** D: **Equivalents** *(accept normality)*

Tossup 3: Math (General)
Though it cannot be oriented, it is either clockwise or counterclockwise, depending on how it was made. If you cut it all the way through the middle, it gets longer and acquires another twist. Name this curious half-twisted strip with only one side, which when glued to another one, makes a Klein bottle.
Answer: **Möbius strip**

Bonus 3: Miscellaneous (Sports)
Name the NFL teams that play in the following stadiums. Give your answers using both city and team name.
A: Raymond James Stadium
B: Hubert H. Humphrey Metrodome
C: Lincoln Financial Field
D: Invesco Field at Mile High
Answers: *(prompt on either half of name)* A: **Tampa Bay Buccaneers** B: **Minnesota Vikings** C: **Philadelphia Eagles** D: **Denver Broncos**

Tossup 4: Science (Chemistry)
They are often used to calibrate thermometers, because they only occur at a very particular temperature and pressure, making them a more useful standard than freezing or boiling points. Water's is just slightly above the normal freezing point of water, at 273.16 Kelvins and 611.73 Pascals. Name this location on a phase diagram where the solid, liquid, and gaseous phases can all exist simultaneously.
Answer: **Triple point**

Bonus 4: Literature (Literature)
Given a short story, name its author.
A: The Lottery
B: Desiree's Baby
C: The Jilting of Granny Weatherall
D: Paul's Case
Answers: A: **Shirley Jackson** B: **Kate Chopin** C: **Katherine Anne Porter** D: **Willa Cather**

Tossup 5: Miscellaneous (Technology)
First released in 1991, it has been estimated that its tens of millions of lines of code would have cost over a billion dollars if its programmers were actually paid. Its mascot is a Gentoo penguin named Tux. Its unusual name comes from a combination of its creator's first name, and the operating system it was intended to replace. Identify this computer operating system whose popular distributions include Red Hat, Debian, and Ubuntu, first written by Linus Torvalds.
Answer: **Linux**

Bonus 5: Fine Arts (Visual Art)
Given a vague, made-up title, give the Impressionist artist for whose body of work the title would be most appropriate.
A: "Things I Found in My Backyard"
B: "Girls Who Love to Dance"
C: "The Cream of Society's Crop"
D: "Heartwarming Family Images"
Answers: A: **Claude Monet** B: **Edgar Degas** C: **Pierre-August Renoir** D: **Mary Cassatt**

Tossup 6: Social Studies (U.S. History)
Its name means "little mountain," and it was displayed on the backs of the nickel and two dollar bill for many years. It was finished around 1770, but when its owner returned after an extended trip, he decided to add some foreign touches to the house, and the dome wasn't added until 1809. Name this Virginia estate, the home of Thomas Jefferson.
Answer: **Monticello**

Bonus 6: Science (Biology)
Identify the specialty of doctor that treats the following.
A: Cancer
B: Skin
C: Kidneys
D: Ears, nose, and throat
Answers: A: **(Hematologist) oncologist** B: **Dermatologist** C: **Nephrologist** D: **Otolaryngologist**

Tossup 7: Literature (Language Arts)
In music, it means to continue following the previous direction in the score. In grammar, it compares the subject to another subject, rather than saying they are the same. Name this device that's fit as a fiddle, and you will be happy as a clam.
Answer: **Simile**

Bonus 7: Social Studies (U.S. History)
Identify the following famous US Supreme Court cases.
A: This decision made it law that public schools could not require recitation of prayers.
B: This 1803 decision established the power of judicial review.
C: This decision concerned "separate but equal" public facilities. It was reversed in 1954.
D: This 1978 decision called for the removal of racial quotas for university and college program admission. It did not forbid special consideration for minority group members.
Answers: A: **Engel v. Vitale** B: **Marbury v. Madison** C: **Plessy v. Ferguson** D: **Regents of the University of California v. Bakke** *(accept Bakke v. Regents)*

Tossup 8: Math (Algebra) -- Computational (30 Seconds)
David is putting five math books on his bookcase, two of them identical. In how many distinguishable orders can he order his five books? This problem can be solved by finding the number of permutations of all five books, divided by the number of permutations of the two identical books. In other words, what is five factorial divided by two factorial?
Answer: **60**

Bonus 8: Social Studies (World History)
Name each of these 20th-century leaders of China.
A: This communist established the People's Republic of China in 1949, and instigated the Great Leap Forward.
B: This man lost the Chinese Civil War to the Communists and then fled to Taiwan.
C: This author of Three Principles of the People helped end the Qing *(CHING)* Dynasty and found the Kuomintang.
D: This man was the third President of the People's Republic of China, serving from 1993-2003.
Answers: A: **Chairman Mao Zedong** *(Prompt on Zedong or Jun-chih; accept Mao Tse-tung)* B: **Chiang Kai-shek** *(prompt on Kai-Shek; accept Chiang Chung-cheng or Jiang Jieshi)* C: **Sun Yat-sen** *(prompt on Yat-sen or Nakayama; accept Sung Chun-shan)* D: **Jiang Zemin** *(prompt on Zemin; accept Chiang Tse-min)*

Tossup 9: Science (Biology)
They have an inner membrane with folds called cristae, that separates the acidic intermembrane space from the matrix. Because they have their own DNA, the endosymbiotic theory suggests that they were actually once separate organisms related to Rickettsia bacteria. Name this cell organelle that performs cellular respiration, the so-called "power plant" of the cell.
Answer: **Mitochondria**

Bonus 9: Math (Other)
Perform the following base conversions. Give your answers one digit at a time.
A: 300 base 10 into base 5
B: 3 6 4 base 7 into base 10
C: 15 base 10 into base 2
D: 8 1 2 base 9 into base 10
Answers: A: **2 2 0 0** B: **1 9 3** C: **1 1 1 1** D: **6 5 9**

Tossup 10: Social Studies (Other)
His Nobel Prize for Physiology or Medicine, awarded in 1904, had little to do with the psychological discovery he has become known for. Name the man who developed the idea of the "conditioned reflex" by noticing dogs' salivating at the sound of the bell they associated with food.
Answer: **Ivan Pavlov**

Bonus 10: Literature (Literature)
Given a line from Shakespeare's Romeo and Juliet, identify the character who speaks it.
A: "O, then I see Queen Mab hath been with you."
B: "My lips, two blushing pilgrims, ready stand to smooth that rough touch with a tender kiss."
C: "These violent delights have violent ends."
D: "There's no trust,No faith, no honesty in men; all are perjur'd All foresworn, all naught, all dissemblers."
Answers: A: **Mercutio** B: **Romeo** C: **Friar Lawrence** *(accept either half)* D: **Nurse**

HALFTIME

Tossup 11: Math (Geometry) -- Computational (30 Seconds)
A cube with a volume of 729 cubic feet is cut to make the largest square pyramid possible. This means that one of the faces of the cube is the base of the pyramid, and the opposite vertex of the pyramid is on the opposite face of the cube. What is the volume of the resulting square pyramid?
Answer: **243 cubic feet** *(prompt for units)*

Bonus 11: Science (Physics)
Name the official SI unit of each of the following quantities.
A: Frequency
B: Capacitance
C: Power
D: Conductance
Answers: A: **Hertz** B: **Farad** C: **Watt** D: **Siemens** *(do not accept mho)*

Tossup 12: Miscellaneous (Entertainment)
It begins with the title character's death, and a newsreel about his entire life. Reporter Jerry Thompson is sent out to find out the meaning of the man's last word, but everyone he interviews ends up talking about something else from the man's life. Name this 1941 movie based loosely on William Randolph Hearst, directed by and starring Orson Welles.
Answer: **Citizen Kane**

Bonus 12: Social Studies (U.S. History)
As you likely know, George Washington was America's first president. Answer these questions about his two terms.
A: Upon his first election, Washington appointed what former chief artillery officer as Secretary of War?
B: What name was given to the uprising resulting from his excise tax on distilled spirits?
C: To normalize trade and land relations with Britain, Washington sent what future chief justice?
D: In his famous farewell address, Washington warned of becoming entangled with the affairs of other nations. Specifically, what two nations were at war at the time?
Answers: A: **Henry Knox** B: **Whiskey Rebellion** C: **John Jay** D: **France and Great Britain** *(accept England)*

Tossup 13: Fine Arts (Visual Art)
It is thought to be a portrait of Jonathan Buttall, son of a wealthy merchant, and the artist is said to have painted it to prove to his rival that the title color could be used predominantly in a portrait. Name this indigo-colored portrait by Thomas Gainsborough.
Answer: **The Blue Boy**

Bonus 13: Math (General)
Identify the type of curve defined by the following equations.
A: x squared plus two y squared equals ten
B: x squared plus three y equals five
C: x squared minus y squared equals one
D: x plus five y equals seven
Answers: A: **Ellipse** B: **Parabola** C: **Hyperbola** D: **Line**

Tossup 14: Literature (Literature)
Considered to be the epitome of satire and the greatest example of sustained irony in the history of the English language, it was misunderstood by many of the author's contemporaries, who criticized him for bad taste. Name this essay, which suggests that the poor children of Ireland should be fattened up and used as a food source, by Jonathan Swift.
Answer: **A Modest Proposal**

Bonus 14: Fine Arts (Music)
Name the Italian composers of the following operas.
A: Rigoletto
B: Turandot
C: La Cenerentola *(CHEN-ur-EN-toh-la)*
D: Amahl and the Night Visitors
Answers: A: **Giuseppe Verdi** B: **Giacomo Puccini** C: **Gioacchino Rossini** D: **Gian-Carlo Menotti**

Tossup 15: Science (Physics)
First proposed in the 1842 paper "On the colored light of the binary star and other stars," it was first confirmed for sound waves in 1845, though any modern observer has heard it in action all his life. Name this effect used in some types of radar, the cause of redshift and blueshift, that causes the pitch of sirens to drop as they pass.
Answer: **Doppler effect/shift**

Bonus 15: Miscellaneous (Interdisciplinary)
Many things are named Lewis.
A: In March 2006, Lewis, this type of animal, was placed under house arrest in Connecticut for attacking neighbors.
B: In chemistry, this type of Lewis compound donates electron pairs to other atoms.
C: British author C. S. Lewis wrote The Chronicles of Narnia, which feature a magical lion with this name.
D: Before going on his famous expedition through the Louisiana Purchase, Meriwether Lewis was the private secretary of this man.
Answers: A: **Cat** B: **Base** C: **Aslan** D: **Thomas Jefferson**

Tossup 16: Social Studies (Current Events)
When you or I enjoy a movie, we may go to see it again or buy the DVD when it comes out. When this man likes a movie, he may order the abduction of the director and lead actress in an effort to build his country's film industry. It is his country's building of a large-scale army and nuclear program that has the world concerned, however. What man, who made more headlines for testing several short range missiles on July Fourth, 2006, is dictator of North Korea?
Answer: **Kim Jong-il** *(prompt on Kim)*

Bonus 16: Literature (Literature)
Identify the authors of the following works of Science Fiction:
A: The Illustrated Man
B: Stranger in a Strange Land
C: The Gods Themselves
D: Ender's Game
Answers: A: **Ray Bradbury** B: **Robert Heinlein** C: **Isaac Asimov** D: **Orson Scott Card**

Tossup 17: Science (Astronomy)
Launched in 1990, it cost two billion dollars to manufacture. Shortly after its launch, however, it was found that its mirror suffered from a soon-fixed spherical aberration caused by a two micrometer error in its polishing. Now able to produce images more accurate than any terrestrial telescope, name this famous space telescope named after the astronomer who showed the universe is expanding.
Answer: **Hubble Space Telescope**

Bonus 17: Math (Algebra)
Solve the following equations for x.
A: Log base 3 of x plus log base 3 of 10 equals log base 9 of 25.
B: Log base 7 of the quantity 49 to the eleventh power, equals log base 4 of the quantity 16 to the power of x
C: Log base 8 of 16 minus log base 8 of 2 equals x
D: Log base 64 of 4 minus the quantity log base 27 of 3 times log base 64 of 2, close quantity, equals x
Answers: A: **1/2** B: **11** C: **1** D: **5/18**

Tossup 18: Social Studies (World History)
This man went by his mother's maiden name, as his father's last name was German for "goose flesh." After moving to Mainz, he and Peter Schoffer created the parts for his most famous invention, which he then used to produce copies of the Bible. Name this man who, in the mid-15th century, invented movable type.
Answer: **Johannes Gutenberg Gensfleisch**

Bonus 18: Literature (Literature)
Identify these characters from Dante's Inferno from the following descriptions.
A: This Roman poet guides Dante through Hell.
B: He judges the condemned sinners and sentences them to one of the lower eight circles of Hell.
C: Found in the eighth circle of Hell with the fraudulent advisors, he tells Dante of his final voyage and death at sea.
D: You must have both answers for this one part. Along with Judas Iscariot, these two Romans reside in the mouth of Satan as traitors against their lord and benefactor.
Answers: A: **Virgil** B: **Minos** C: **Ulysses** *(accept Odysseus)* D: **Brutus and Cassius**

Tossup 19: Math (Calculus) -- Computational (30 Seconds)
Find the area under the curve y equals 14x squared minus 20x, between the lines x equals zero and x equals three. It may help you to realize that, because every term in the indefinite integral contains an x term, the area is simply equal to the indefinite integral at 3.
Answer: **36 square units**

Bonus 19: Social Studies (Geography)
Given a description, name the body of water located in Illinois.
A: Beginning in Fond du Lac County, Wisconsin, this river flows south through Janesville before entering Illinois. It joins the Mississippi River near the Quad Cities.
B: Starting in Wisconsin, this river flows through Kane County and meets up with the Illinois River near Ottawa.
C: This river starts in Ohio, and then forms a portion of the Illinois-Indiana border before joining with the Ohio River.
D: In 1900, this river's flow was reversed so it would not enter Lake Michigan. It eventually joins the Illinois River.
Answers: A: **Rock River** B: **Fox River** C: **Wabash River** D: **Chicago River**

Tossup 20: Literature (Literature)
Give the title, which is also the last four words. Written by Robert Frost, this poem was used in The Outsiders by S.E. Hinton. Without the last line, it reads "Nature's first green is gold, her hardest hue to hold. Her early leaf's a flower, but only so an hour. Then leaf subsides to leaf, so Eden sank to grief, so dawn goes down to day..."
Answer: **Nothing gold can stay**

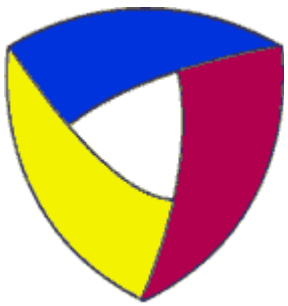
Bonus 20: Science (Chemistry)
Name the gas law.
A: Pressure and volume are inversely proportional.
B: Volume and temperature are directly proportional.
C: Temperature and pressure are directly proportional.
D: Volume and number of moles are directly proportional.
Answers: A: **Boyle's Law** B: **Charles's Law** *(do not accept Law of Charles and Gay-Lussac)* C: **Gay-Lussac's Law** *(accept Law of Charles and Gay-Lussac)* D: **Avogadro's Law**

TIEBREAKERS/REPLACEMENTS:

Tossup: Literature (Literature)
Gabriel Garcia Marquez called him “the greatest poet of the 20th century in any language.” He is perhaps best known for his controversially erotic love poems, though he also wrote political, historical, and surrealist poems. Name this Chilean poet who received the 1971 Nobel Prize in Literature, the author of Twenty Love Poems and a Song of Despair.
Answer: **Pablo Neruda**

Tossup: Social Studies (Other)
The term was coined in 1305, but evidence of its use goes back to the reign of Henry II. Back then, it was by the king to give a litigant an opportunity to state his case in front of the king. Guaranteed in Article 1, Section 9 of the U.S. Constitution, it was the subject of the case Hamdan v. Rumsfeld. Abraham Lincoln notably suspended this writ during the Civil War to deter Copperheads. Give this two word Latin term which means “that you may have the body.”
Answer: **Habeas corpus**

Bonus: Math (General)
Answer the following questions about the binomial theorem.
A: What Greek symbol at the left of the formula signifies that all terms in the expansion should be added together?
B: Which mathematician lends his name to a handy shape for finding the coefficient of each term in the expansion without using combinations?
C: Find the sum of all the coefficients in the expansion of the quantity (x+y), raised to the fifth power.
D: What is the third term in the expansion of the quantity (3x^2 – 2y), raised to the sixth power?
Answers: A: **Sigma notation** B: **Blaise Pascal** *(accept Pascal's triangle)* C: **32** D: **4860 x^8 y^2**



Ægis Questions

11th IHSSBCA Kickoff, 2006
Round 2

Tossup 1: Literature (Literature)
The author's youth at Exeter inspired the boarding-school setting of the book, which examines themes of loss of innocence and the second self through two teenaged boys at prep school during World War II. Name this novel set at Devon school and including the characters Finny and Gene, written by John Knowles.
Answer: **A Separate Peace**

Bonus 1: Math (Geometry)
Find the volume for these shapes. Leave pi or radicals in place when needed.
A: A cylinder of radius 12 inches and height of 7 inches.
B: A sphere of radius 6 inches.
C: A regular triangular prism with base sides of 7 inches and height of root 3 inches.
D: A cube of sidelength 9 inches.
Answers: A: **1008 pi inches cubed** B: **288 pi inches cubed** C: **147/4 inches cubed** *(accept 36.75 inches cubed)* D: **729 inches cubed**

Tossup 2: Science (Chemistry)
Common types include methyl violet, alizarin yellow, bromocresol green, and azolitmin, though the last one usually goes by another name. The universal type is just a blend of individual salts, like methanol, methyl red, and phenolphthalein *(FEE-nol-THAY-leen)*, and can detect a much larger range. Name this type of chemical that changes color to show the pH of a substance it is added to.
Answer: **pH indicator**

Bonus 2: Social Studies (U.S. History)
Given an acronym of a New Deal agency, state the full name of the agency.
A: CCC
B: TVA
C: WPA
D: NLRB
Answers: A: **Civilian Conservation Corps** B: **Tennessee Valley Authority** C: **Works Progress Administration** D: **National Labor Relations Board**

Tossup 3: Math (Algebra) -- Computational (30 Seconds)
y varies inversely as x. If x equals 110 when y equals 4, what does y equal when x equals 1000?
Answer: **0.44** *(accept 11/25)*

Bonus 3: Science (Earth Science)
Name these scales of measuring physical phenomena.
A: Ranging from 1 to 10, this scale measures the hardness of minerals.
B: Ranging from 1 to 12, this scale measures the intensity of wind.
C: Ranging from Category F0 to Category F6, this scale measures the intensity of tornadoes.
D: Ranging from Category 1 to Category 5, this scale measures the intensity of hurricanes.
Answers: A: **Mohs hardness scale** B: **Beaufort wind force scale** C: **Fujita(-Pearson) scale** D: **Saffir-Simpson hurricane scale**

Tossup 4: Social Studies (U.S. History)
Her father was John Dandridge, and her first husband was Daniel Custis, who she had four children with. Two years after Custis died she married her more famous husband. However, she did not spend her entire marriage at their Virginia estate because she traveled with her husband, who was leading the American Revolution. Name this wife of George Washington.
Answer: **Martha Dandridge Custis Washington** *(Prompt on Washington)*

Bonus 4: Literature (Literature)
Given the year and the author, name the winner of the Newbery Medal for children's literature.
A: 1970; William H. Armstrong
B: 1979; Ellen Raskin
C: 1990; Lois Lowry
D: 1995; Sharon Creech
Answers: A: **Sounder** B: **The Westing Game** C: **Number the Stars** D: **Walk Two Moons**

Tossup 5: Fine Arts (Visual Art)
The boy holding pistols is thought to have been the inspiration for the character Gavroche in Hugo's Les Miserables, which like the painting was based on the July Revolution of 1830 and not the more well-known 1789 Revolution. Name this allegorical work by Eugene Delacroix.
Answer: **Liberty Leading the People** *(accept La Liberté guidant le peuple)*

Bonus 5: Social Studies (World History)
Name the following World War II codenamed operations from their descriptions.
A: The preliminary planning for this British plan for the evacuation at Dunkirk began four days before the invasion did. It was named for the room where Churchill was briefed regarding the plans.
B: This German plan for the invasion of the Soviet Union opened the eastern front of the war. It was named for a Holy Roman Emperor and took place in 1941.
C: This German operation to invade the United Kingdom was never undertaken. It would have required the disabling of most British submarine units and the extreme destruction of the RAF.
D: This invasion of North Africa by British and American forces began in November 1942. It was the reopening of a second front to the war, and began in Morocco and Algeria.
Answers: A: **Operation Dynamo** B: **Operation Barbarossa** C: **Operation Sealion** D: **Operation Torch**

Tossup 6: Miscellaneous (Sports)
First held in Uruguay in 1930 with 13 participating teams, it was not held from 1942 to 1946. Even though the finals are held every four years, it takes up to three years for the qualifying rounds to be completed. It has been hosted and won by the same team six times, this most recently occurring in 1998. Name this world famous event that has been won by Brazil a record five times.
Answer: **FIFA World Cup** *(Accept Soccer World Cup or equivalents)*

Bonus 6: Fine Arts (Music)
Name the British composers who wrote the following works.
A: Dido and Aeneas
B: Sinfonia Antarctica
C: A Young Person's Guide to the Orchestra
D: The Enigma Variations
Answers: A: **Henry Purcell** B: **Ralph Vaughn Williams** *(prompt Williams)* C: **Benjamin Britten** D: **Edward Elgar**

Tossup 7: Science (Biology)
Born Johann, he changed his name after entering a monastery, where he conducted his famous studies culminating in his 1865 paper "Experiments on Plant Hybridization." Name this 19th century abbot who bred 28,000 pea plants, now known as the "father of modern genetics."
Answer: **Gregor Mendel**

Bonus 7: Literature (Literature)
Many characters die in Shakespeare plays. Given the last words of a character, name him or her.
A: Lay on, Macduff, and damn'd be him that first cries, 'Hold, enough!'
B: O happy dagger! This is thy sheath; there rust, and let me die.
C: I do prophesy the election lights on Fortinbras: he has my dying voice; so tell him, with the occurrents, more and less, which have solicited. The rest is silence.
D: Do you see this? Look on her, look, her lips, look there, look there!
Answers: A: **Macbeth** B: **Juliet** C: **Hamlet** D: **King Lear**

Tossup 8: Math (General) -- Computational (30 Seconds)
What is the value of the determinant of the three by three matrix with top row 0, 2, 3, middle row 4, 2, 0, and bottom row 3, -2, 6?
Answer: **-90**

Bonus 8: Science (Chemistry)
Name these portions of the periodic table of the elements.
A: The leftmost column of the periodic table, these metals are silvery-colored, and react vigorously with water to form bases.
B: Consisting of ten columns in the middle of the table, these metals of the d-block fill the gap between the s-block and p-block.
C: Elements 57 through 71 are members of this period, named after element 57.
D: Elements 89 through 103 are members of this period, named after element 89.
Answers: A: **Alkali metals** *(do not accept alkaline earth metals)* B: **Transition metals** C: **Lanthanides** D: **Actinides**

Tossup 9: Literature (Literature)
After helping Truman Capote research In Cold Blood, she is only known for one book, leading to the suspicions that Capote wrote some or most of her novel about racial prejudice. Name this author who won the 1961 Pulitzer Prize for fiction and Library Journal's 1999 award for "Best Novel of the Century," both for To Kill a Mockingbird.
Answer: **Harper Lee**

Bonus 9: Miscellaneous (Other)
The SAT and ACT aren't the only important standardized tests. Give the abbreviations or full names of the following tests.
A: This test administered by Educational Testing Services measures English proficiency in non-native college-bound students.
B: ETS also administers this test for graduate-school admissions, similar to the SAT.
C: The Law School Admission Council administers this test measuring verbal and analytical proficiency.
D: The Association of American Medical Colleges administers this test measuring verbal and scientific proficiency.
Answers: A: **TOEFL** *(Test of English as a Foreign Language)* B: **GRE** *(Graduate Record Examination)* C: **LSAT** *(Law School Admission Test)* D: **MCAT** *(Medical College Admission Test)*

Tossup 10: Social Studies (Geography)
The Canadians and Germans fought a battle for this French city from 1944 to 1945, though it is more famous for an event earlier in the war. Located on the French coast, Dutch is still spoken in a few areas, and its name comes from the Dutch words for "dune" and "church". Name this city, whose most famous moment came in 1940 when nearly 340,000 soldiers were evacuated from it.
Answer: **Dunkirk**

Bonus 10: Math (Algebra)
Given a starting value and common ratio, find the sum of each of the following infinite geometric series, or state that the series diverges.
A: Starting value of 5, common ratio of 1/2.
B: Starting value of 1, common ratio of -1/2.
C: Starting value of -4, common ratio of 1/3.
D: Starting value of 3, common ratio of -2.
Answers: A: **10** B: **2/3** C: **-6** D: **Diverges**

HALFTIME

Tossup 11: Social Studies (World History)
Published in 1848, the preamble of this work begins “There is a specter haunting Europe” and goes on to state that the powers of Europe fear and persecute, but do not understand, a certain ideology. Advocating a revolution against capitalism, what work was nominally co-written by Friedrich Engels, but dominated by the thoughts and words of Karl Marx?
Answer: **The Communist Manifesto**

Bonus 11: Literature (Language Arts)
Unfortunately, not all plurals are formed by adding "s" to the end of words. Spell the plurals of the following words:
A: Louse
B: Genus
C: Alumna
D: Focus
Answers: A: **LICE** B: **GENERA** C: **ALUMNAE** D: **FOCI**

Tossup 12: Math (Calculus) -- Computational (30 Seconds)
A particle's position can be described by the function 6x cubed plus 10x squared plus 11x. What is the velocity of that particle at the point where its acceleration is 56?
Answer: **49 units per second**

Bonus 12: Science (Biology)
Answer these questions about enzymes.
A: Enzymes act as this type of chemical compound that speed up chemical reactions.
B: The molecules that enzymes manipulate are called these.
C: The location on an enzyme to which those molecules bind is called this type of site.
D: Some enzymes have this quality, which means that they are as efficient as possible, and their conversion rate is only limited by the rate of the molecules' diffusion.
Answers: A: **Catalyst** B: **Substrate** C: **Active site** D: **Catalytically perfect** *(prompt on perfect)*

Tossup 13: Literature (Literature)
He introduced the character Professor Challenger in his 1912 science-fiction novel The Lost World. His more famous character is taken care of by Miss Hudson and introduced in "A Study in Scarlet." Identify this doctor-turned-author who put the words "When you have eliminated the impossible, whatever remains, however improbable, must be the truth" into the mouth of Sherlock Holmes.
Answer: **Sir Arthur Conan Doyle**

Bonus 13: Miscellaneous (Entertainment)
According to the users of IMDb, the Internet Movie Database, these are, in order, the top four films of all time.
A: Ranked number one at IMDb, this 1972 film stars Marlon Brando as Vito Corleone.
B: Number two at IMDb, this 1994 drama stars Tim Robbins as Andy Dufresne, who is convicted for his wife's murder.
C: Number three at IMDb, this 1974 film stars Al Pacino as Michael Corleone, son of Vito Corleone.
D: Number four at IMDb, this 2003 movie was directed by Peter Jackson, and won 11 Oscars.
Answers: A: **The Godfather** B: **The Shawshank Redemption** C: **The Godfather: Part II** *(do not accept The Godfather)* D: **The Lord of the Rings: The Return of the King** *(prompt on Lord of the Rings)*

Tossup 14: Fine Arts (Music)
Earning more royalties today than any other French musician, he is undoubtedly famous, though he is perhaps best known for his orchestrations. His piano pieces often feature very difficult sparkling passages, with names like Water Games, and Mirrors. Though many people do not know his name, his orchestration of Pictures at an Exhibition is more often played than the original piano piece. Name this French composer who once described his most famous work as "a piece for orchestra without music," called Boléro.
Answer: **Maurice Ravel**

Bonus 14: Social Studies (U.S. History)
Given a U.S. President, name the man who assassinated him.
A: Abraham Lincoln
B: James Garfield
C: William McKinley
D: John F. Kennedy
Answers: A: **John Wilkes Booth** B: **Charles Guiteau** *(gee-TOE)* C: **Leon Czolgosz** *(CHO-guh-lohsh)* D: **Lee Harvey Oswald**

Tossup 15: Science (Biology)
This insect was represented by the Greeks as the winged girl Psyche *(SY-kee)*. They live all around the world and their wing span ranges from three-eighths of an inch to 11 inches across. The most recognizable ones include the Painted Lady and Monarch species. Name these insects that belong in the order Lepidoptera *(leh-pid-OP-trah)*, the adult form of caterpillars.
Answer: **Butterfly**

Bonus 15: Math (General)
Evaluate the following expressions.
A: Five squared multiplied by seven squared.
B: Fourteen factorial divided by twelve factorial.
C: The log base four of 1024.
D: The base eight numeral six five four, in base ten.
Answers: A: **1225** B: **182** C: **5** D: **428**

Tossup 16: Miscellaneous (Technology)
With over 7 billion dollars in revenue a year, the algorithm that powers it started out as a research project in 1996, and was patented in 2001. In July 2006, its name was added to the Oxford English Dictionary as a verb. Name this company founded by two Stanford graduates, Sergey Brin and Larry Page, a search engine famous for its spartan website.
Answer: **Google**

Bonus 16: Science (Physics)
Ignore significant figures. A projectile is fired from ground level at an angle of 30 degrees above the horizontal, with an initial velocity of 100 meters per second.
A: In meters per second, what is the upward component of its velocity?
B: Using -10 meters per second squared as gravitational acceleration, how many seconds does it take for the projectile to reach the ground again?
C: Halfway through its flight, it reaches its maximum height. In meters, what is it?
D: How many meters does the projectile travel horizontally? Give an exact answer.
Answers: A: **50 meters per second** B: **10 seconds** C: **125 meters** D: **500√3 meters**

Tossup 17: Social Studies (U.S. History)
Among its crew were Dick Scobee, Judith Resnik, Gregory Jarvis, and Christa McAuliffe. McAuliffe would have been the first teacher in outer space, had a joint on the solid rocket booster worked properly. Name this space shuttle that shortly after takeoff on January 28th, 1986, disintegrated.
Answer: **Space Shuttle Challenger**

Bonus 17: Literature (Literature)
Identify the Charles Dickens novel in which these characters appear.
A: Uriah Heap
B: Phillip Pirrip
C: Bob Cratchit
D: Fagin
Answers: A: **David Copperfield** B: **Great Expectations** C: **A Christmas Carol** D: **Oliver Twist**

Tossup 18: Math (Other) -- Computational (30 Seconds)
Express your answer as a reduced fraction. Find the probability of flipping heads three out of five times. It may help to realize that there are two to the fifth possibilities for the set of coin flips, and that combinatorics can be used to find the number of those flip combinations that contain three heads.
Answer: **5/16**

Bonus 18: Social Studies (Other)
Given a European country, name its currency. Sorry, none of the answers are the Euro.
A: Estonia
B: Latvia
C: Switzerland
D: Republic of Macedonia
Answers: A: **Estonian Kroon** B: **Lats** C: **Swiss Franc** *(Prompt on Franc)* D: **Macedonian Denar**

Tossup 19: Literature (Literature)
Most likely based on Lafayette County, its name comes from two Chickasaw words meaning "split land." In the northwest part is the Sutpen plantation, and near the central town of Jefferson are the Sartoris and Compson plantations. Name this fictional Mississippi county created by William Faulkner.
Answer: **Yoknapatawpha County**

Bonus 19: Fine Arts (Visual Art)
Name these artistic movements.
A: Meaning "wild beasts," this movement was characterized by exaggerated colors and simple lines.
B: This absurdist movement takes its name from the French for "hobby-horse," a word supposedly chosen by sticking a knife into a dictionary.
C: Also known as 1925 Style, this movement got its name and style from a 1925 World's Fair in Paris. Primarily influencing architecture, it uses bold forms like zig-zags and sunbursts.
D: With a name coined by John McHale in 1954, this style was described by Richard Hamilton as "transient, expendable, low-cost, mass-produced, young, witty, sexy, gimmicky, glamorous, and Big Business."
Answers: A: **Fauvism** *(or Fauvist)* B: **Dadaism** *(or Dada)* C: **Art Deco** D: **Pop Art** *(do not accept Op Art)*

Tossup 20: Science (Physics)
It produces a great deal of energy for heavy elements, because their binding energy per nucleon is higher than that of lighter elements. Either induced or spontaneous, it requires a critical mass to sustain a chain reaction. Often started artificially by bombarding certain elements with neutrons, name this nuclear process in which nuclei split into smaller atoms.
Answer: **Nuclear fission**

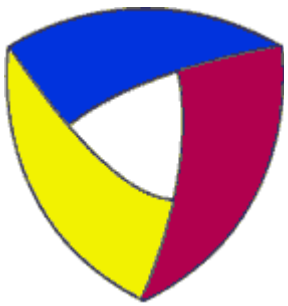
Bonus 20: Math (Calculus)
Find the indefinite integrals of each of the following functions. Do not include a constant of integration in your answers.
A: 20 sine of x times cosine of x.
B: 18x to the fifth power minus 9x squared.
C: One over the square root of x.
D: 3 pi squared.
Answers: A: **10 sine squared of x** *(accept negative ten cosine squared of x)* B: **3x^6 - 3x^3** *(three x to the sixth minus three x cubed)* C: **2√x** D: **3 pi squared times x**

TIEBREAKERS/REPLACEMENTS:

Tossup: Science (Physics)
In 1933, he designed a car that could seat eleven passengers and get thirty miles per gallon, double what Ford Explorers do seventy years later. The emphasis on efficiency is also present in his "Spaceship Earth" worldview and in the products under the Dymaxion brand name. Identify the visionary whose most famously efficient invention was the geodesic dome.
Answer: **Richard Buckminster Fuller**

Tossup: Literature (Literature)
In the classic holiday film A Christmas Story, Ralphie and his classmates are subjected to the study of this novel, the story of a lonely weaver who finds fulfillment when he takes in a golden-haired orphan. Name the novel by George Eliot.
Answer: **Silas Marner**

Bonus: Social Studies (U.S. History)
Name the Amendment to the U.S. Constitution in which each of the following phrases can be found.
A: Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted.
B: The Congress shall have power to lay and collect taxes on incomes.
C: The right of citizens of the United States, who are 18 years of age or older, to vote, shall not be denied or abridged by the United States or any state on account of age.
D: The terms of the President and Vice President shall end at noon on the 20th day of January.
Answers: A: **8th** B: **16th** C: **26th** D: **20th**



Ægis Questions

11th IHSSBCA Kickoff, 2006
Round 3

Tossup 1: Math (Algebra) -- Computational (30 Seconds)
Solve the following expression for all real roots: 5x^2-52x+63=0.
Answer: **x = 7/5** *(or 1.4 or 1 2/5)* **and 9** *(must have both answers in either order)*

Bonus 1: Social Studies (World History) -- Five Parts
Sometimes it seems as though France can never settle down.
A: The First Republic of France was established in 1792 after the French Revolution, and was ended in 1804 by this man who served as First Consul starting in 1799.
B: The Second Republic started in 1848, after this last king of France abdicated the throne.
C: The Third Republic began in 1870 after the collapse of the Second Empire of France, following this war provoked by Otto von Bismarck.
D: The Fourth Republic began in 1946 after the end of World War II. During the war, France was ruled by this puppet regime after France fell to Germany in 1940.
E: The Fifth Republic began in 1958 after reforms to the fourth constitution instituted by this first president of the Fifth Empire and general during World War II.
Answers: A: **Napoleon Bonaparte I** *(do not accept other Napoleons)* B: **Louis-Philippe** C: **Franco-Prussian War** D: **Vichy regime** E: **Charles de Gaulle**

Tossup 2: Fine Arts (Visual Art)
Although critics have tried to interpret the meaning of such dominant images as the horse, the bull, and the light bulb, the artist himself claimed that he simply painted them for what they were. Name this work painted after the 1937 bombing of a Spanish city, a famous painting by Pablo Picasso.
Answer: **Guernica**

Bonus 2: Literature (Literature)
Pick these low-hanging works of literature from the tree.
A: This novel chronicles the story of the Joad family, on their trek from Oklahoma to California.
B: The title character lives with Sponge and Spiker, his two aunts, and the magic potion he drops creates the titular fruit.
C: Alex is the main character of this novel, which follows his exploits with his 'droogs' and features a made up language based on Russian slang.
D: This J.D. Salinger short story is his first concerning the Glass family. It describes Muriel and Seymour's Florida honeymoon.
Answers: A: **The Grapes of Wrath** B: **James and the Giant Peach** C: **A Clockwork Orange** D: **A Perfect Day for Bananafish**

Tossup 3: Social Studies (U.S. History)
This man belonged to many parties throughout his political career, including the Federalists, Democratic-Republicans, and Whigs. In the 1790s he served as a minister to Holland, Portugal, and Prussia, and was elected to Congress in 1802. He negotiated the Treaty of Ghent to end the War of 1812, and while serving as Secretary of State under James Monroe he acquired Florida from Spain. Name this sixth president of the United States, the son of a former president.
Answer: **John Quincy Adams** *(Accept JQ Adams; prompt on Adams)*

Bonus 3: Math (General)
Given the following set of numbers: 5, 15, 24, 24, 25, 55, and 62, answer the following questions.
A: What is the range of the set?
B: What is the mean of the set?
C: What number would you need to add to the set to obtain a mean of 32.5?
D: What number would you need to add to the set to obtain a mean of 12?
Answers: A: **57** B: **30** C: **50** D: **-114**

Tossup 4: Literature (Literature)
His exhibition name, Willingdon Beauty, comes from the city near the farm where he lived. In his only speech, he says the word 'comrade' 12 times and proposes, among other things, a song uniting the audience entitled "Beasts of England." Name this boar whose speech inspired the revolution against Mr. Jones at Manor Farm.
Answer: **Old Major**

Bonus 4: Social Studies (Geography)
Given bodies of water near a peninsula, name the peninsula.
A: The Sea of Japan to the east, and the Yellow Sea to the west.
B: The Atlantic Ocean to the west, and the Mediterranean Sea to the south.
C: The Pacific Ocean to the west, and the Sea of Cortés to the east.
D: The Caribbean Sea to the east, and the Gulf of Mexico to the north.
Answers: A: **Korean Peninsula** B: **Iberian Peninsula** C: **Baja California Peninsula** *(Accept Lower California Peninsula)* D: **Yucatán Peninsula**

Tossup 5: Science (Astronomy)
It has three satellites, the smaller ones named Nix and Hydra. With less than a fifth the mass of the earth's moon, it forms a binary system with its larger moon, Charon. Name this dwarf planet, discovered in 1930 at Lowell Observatory by Clyde Tombaugh, the former ninth planet of the solar system.
Answer: **Pluto**

Bonus 5: Miscellaneous (Entertainment) -- Three Parts
Given the description of a movie from the Back to the Future trilogy, name it.
A: In this one, Marty has to travel back to 1955 so he can fix an alternate reality that was created when Biff stole the time machine and went back in time.
B: In this movie, Marty has to make sure his parents fall in love at the Enchantment Under the Sea Dance, to ensure that they will fall in love and him and his siblings will not disappear.
C: In this one, Marty travels back to 1885 to make sure Dr. Brown is not murdered.
Answers: A: **Back to the Future Part II** B: **Back to the Future Part I** C: **Back to the Future Part III**

Tossup 6: Math (Calculus) -- Computational (30 Seconds)
Find the slope of the derivative of the function y equals 5x cubed minus 12x plus 17 at the point (4, 277). It may help you to know that the slope of the derivative can be considered the same as the value of the second derivative at the desired point.
Answer: **120**

Bonus 6: Science (Biology)
Identify these structures of the kidney.
A: This is the basic functional unit of kidneys.
B: A sac that surrounds the glomerulus *(glo-MUR-yuh-lus)*, it collects wastes from the blood.
C: Connecting the proximal and distal tubules, this long tube reabsorbs water and ions from urine.
D: After urine is concentrated in the kidney, it is passed to the bladder through these ducts.
Answers: A: **Nephron** B: **Bowman's capsule** C: **Loop of Henle** D: **Ureter** *(do not accept urethra)*

Tossup 7: Social Studies (U.S. History)
The Federalists did not want to ratify the deal, fearing that it would anger the British. It ended up costing roughly 3 cents per acre, and would eventually make up more than 20% of the country. Name this deal announced by President Jefferson on Independence Day, 1803, that would give the United States a lot of territory west of the Mississippi River.
Answer: **Louisiana Purchase Treaty**

Bonus 7: Fine Arts (Music)
Name these Verdi operas.
A: This opera features a Moorish general, and is based on a Shakespeare play of the same name.
B: This opera is named after Shakespeare's Sir John, a friend of Henry the Fifth.
C: This opera is named after a hunchback court jester whose daughter Gilda offers her life to save the Duke of Mantua.
D: This opera was first performed in Cairo. Many falsely believe that it was written to commemorate the opening of the Suez Canal.
Answers: A: **Otello** B: **Falstaff** C: **Rigoletto** D: **Aida**

Tossup 8: Miscellaneous (Technology)
It owns many other popular websites, like the Internet Movie Database and Alexa Internet. Originally named Cadabra, it was founded in 1995 by Jeff Bezos, and did not become profitable until 2002. Name this online company with an annual revenue of eight and a half billion dollars, a popular online bookstore.
Answer: **Amazon.com**

Bonus 8: Literature (Literature)
Given the title character or characters of a Shakespearean play, give the title of the play.
A: Caius Martius
B: Antonio
C: Mistress Ford and Mistress Page
D: Proteus and Valentine
Answers: A: **Coriolanus** B: **The Merchant of Venice** C: **The Merry Wives of Windsor** D: **The Two Gentlemen of Verona**

Tossup 9: Science (Chemistry)
It only occurs at temperatures and pressures below the triple point. Water undergoes it during the freeze-drying process. Also employed by some printers to more precisely affix dye, what is this process, whose opposite is deposition, by which a substance changes directly from a solid into a gas?
Answer: **Sublimation**

Bonus 9: Math (Other)
Drawing from a standard deck of cards with replacement, find the probability that the following events occur. Express your answers as fully reduced fractions.
A: Drawing a face card, then a spade.
B: Drawing a prime number, then an ace.
C: Drawing a one-eyed jack, then a two-eyed jack.
D: Drawing a pair.
Answers: A: **3/52** B: **4/169** C: **1/676** D: **1/13**

Tossup 10: Literature (Literature)
He won the 1926 Pulitzer Prize with a novel about an idealistic medical researcher in the small town of Zenith. He declined the prize on the basis that the terms of the award conflicted with his message. In 1930, however, he accepted the Nobel Prize in Literature, becoming the first American to win the award. Name this author known for his satirical portrayals of American life in works such as Elmer Gantry, Arrowsmith, Babbit, and Main Street.
Answer: **Sinclair Lewis**

Bonus 10: Science (Chemistry)
Give the chemical formulas for the following acids.
A: Hydroiodic *(HY-dro-i-OH-dic)* acid
B: Sulfuric acid
C: Boric acid
D: Nitrous acid
Answers: A: **HI** B: **H2SO4** C: **H3BO3** D: **HNO2**

HALFTIME

Tossup 11: Math (Algebra) -- Computational (30 Seconds)
What is the period of the function y equals 11 times the tangent of the quantity 2 pi x, close quantity, plus 5? It may help you to know that the period of the parent tangent function is half of that of the parent sine and cosine functions.
Answer: **1/2**

Bonus 11: Social Studies (Current Events)
Identify the following about the current race for Governor.
A: Identify the incumbent Governor of Illinois.
B: Identify the Republican Party's candidate for Governor.
C: Give the current position of the person in number two.
D: This man from Carbondale is the Illinois Green Party's candidate for Governor.
Answers: A: **Milorad "Rod" R. Blagojevich** B: **Judy Baar Topinka** C: **Illinois State Treasurer** D: **Rich Whitney**

Tossup 12: Miscellaneous (Other)
It debuted in 1921 by Taggart Baking Company, and its packaging design was inspired by the colorful International Balloon Race at the Indianapolis Speedway. In the 1940s vitamins were added, leading to the slogan "Helps build bodies in 12 different ways." Name this brand of very soft white bread.
Answer: **Wonder Bread**

Bonus 12: Literature (Literature)
Give the nickname of each of the following characters in the novel To Kill a Mockingbird.
A: Arthur Radley
B: Jeremy Atticus Finch
C: Jean Louise Finch
D: Charles Baker Harris
Answers: A: **Boo** B: **Jem** C: **Scout** D: **Dill**

Tossup 13: Science (Biology)
It's one of the few human organs that can regenerate itself using unipotential stem cells. The portal vein leads into it from the pancreas, spleen, and small intestines so it can process nutrients from the digestive system before they are circulated around the body. Name this organ that metabolizes medicines and poisons, and can suffer from cirrhosis and hepatitis, the largest organ in the human body.
Answer: **Liver**

Bonus 13: Math (Geometry)
Solve the following geometry problems.
A: Find the area of a square if its diagonal measures 32 inches.
B: Find the area of a 90 degree sector of a circle with radius 7 inches.
C: Find the area of a triangle with side lengths 15, 36, and 39 inches.
D: Find the volume of a cube whose circumscribed sphere has radius 15 inches.
Answers: *(prompt for units)* A: **512 square inches** B: **49π/4 square inches** *(accept 12.25π, 12 and 1/4 π)* C: **270 square inches** D: **3000 √3 cubic inches**

Tossup 14: Literature (Literature)
Written in trochaic octameter *(tro-KAY-ick oc-TAM-i-tur)*, this poem's eighteen stanzas each have five and a half lines, and each ends with the word "more." Name this poem narrated by a man who, on a "midnight dreary," started hearing the name of his lost love, Lenore, spoken by the titular bird. It was written by Edgar Allen Poe.
Answer: **The Raven**

Bonus 14: Science (Physics)
Answer these questions about the discovery of the electron.
A: This physicist discovered the electron in cathode ray tubes, and integrated them into his "plum pudding" model of the atom.
B: The electron's charge-to-mass ratio was accurately measured in this famous experiment by Robert Millikan.
C: This Danish physicist's model of the atom had electrons orbiting the nucleus in discrete orbitals.
D: This American physicist formulated the electron-pair theories of covalent *(co-VAY-lent)* bonds and acid-base chemistry, the latter now bearing his name.
Answers: A: **J. J. Thomson** B: **Oil-drop experiment** C: **Niels Bohr** D: **Gilbert Lewis**

Tossup 15: Fine Arts (Music)
It starts with "The Bringer of War," followed by "The Bringer of Peace," and "The Winged Messenger." Though there are now eight of the titular objects, the suite only contains seven pieces, because the other was apparently too unexciting. Name this orchestral suite that also contains "Jupiter, the Bringer of Jollity," written by Gustav Holst.
Answer: **The Planets**

Bonus 15: Miscellaneous (Sports)
Name these players who were acquired by the Chicago Bulls in the 2006 off-season.
A: This 4-time Defensive Player of the Year was signed as a free agent to a $60 million dollar contract. The Detroit Pistons signed Nazr Mohammed to make up for the loss.
B: This Texas power forward was drafted second overall by the Bulls in the 2006 draft. Many critics panned the idea of picking him, as he was overmatched by the answer to part 3 in the 2006 NCAA Tournament.
C: This LSU power forward was actually drafted 4th by the Portland Trail Blazers, but was traded to the Bulls for the answer to part 2, much to the delight of said critics.
D: This Swiss player was drafted 13th in the 2006 NBA Draft by Philadelphia, and was traded to the Bulls for 16th overall pick Rodney Carney, a 2007 second-round pick, and cash.
Answers: A: **Ben Wallace** *(prompt on Big Ben)* B: **LaMarcus Aldridge** C: **Tyrus Thomas** D: **Thabo Sefolosha**

Tossup 16: Social Studies (World History)
This man was supportive of the death sentence Spanish heretic Michael Servetus received. Servetus had come to Switzerland in the middle of the 16th century, in the midst of this man's religious experiment there. Name this rival of Martin Luther, a preacher of predestination, who ran a religious colony in Geneva.
Answer: **John Calvin** *(prompt on Calvinus; accept Jean Chauvin or Cauvin)*

Bonus 16: Fine Arts (Visual Art)
Given a description, name the American painting.
A: This Grant Wood work features a man and a woman holding a pitchfork.
B: Three people are sitting at a bar in this painting by Edward Hopper.
C: In this work by Winslow Homer, a man in a small boat is surrounded by rough waters and sharks.
D: In this Andrew Wyeth painting, a woman in a pale pink dress is laying across a green landscape.
Answers: A: **American Gothic** B: **Nighthawks** C: **The Gulf Stream** *(Accept Golfstrom)* D: **Christina's World**

Tossup 17: Literature (Language Arts)
As a dialect, it is very distinctive, with added "r"s and dropped "h"s. It has some borrowings from Yiddish such as 'shtumm', meaning 'quiet'; and some from Romany such as 'wonga' and 'cushty', meaning 'money' and 'good' respectively. Defined as anyone born within earshot of the bells of St. Mary-le-Bow church, name this accent from the East End of London.
Answer: **Cockney**

Bonus 17: Social Studies (U.S. History)
Name the Amendment to the U.S. Constitution in which each of the following phrases can be found.
A: Neither slavery nor involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States.
B: The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any state on account of sex.
C: The enumeration in the Constitution, of certain rights, shall not be construed to deny or disparage others retained by the people.
D: The eighteenth article of amendment to the Constitution of the United States is hereby repealed.
Answers: A: **13th** B: **19th** C: **9th** D: **21st**

Tossup 18: Science (Physics)
Measured in ergs or, like torque, in kilogram meters squared per second squared, it can be defined as the line integral of the dot product of force and displacement. Or more simply, as force times distance. Name this physical quantity that can be electrical, thermodynamic, or mechanical, a measurement of change in energy, whose SI unit is the joule.
Answer: **Work** *(accept energy before mentioned in last sentence)*

Bonus 18: Math (Algebra)
Find the slope of each of the following lines.
A: 3x-4y=17
B: 11x-10y=9x-4
C: The line parallel to 4x-6y=2
D: The line perpendicular to 19x+11y=9
Answers: A: **3/4** *(or .75)* B: **1/5** *(or .2)* C: **2/3** D: **11/19**

Tossup 19: Social Studies (Other)
For sixteen of his twenty-five years at the FBI, he maintained a psychological power trip in which he gave away secrets to the KGB and SVR under the alias Ramon Garcia. Frequently considered a rival to reknowned double agent Aldrich Ames for most damaging release of information, he now serves a life prison sentence after asking law enforcement "what took you so long?" upon his arrest February 18, 2001.
Answer: **Robert Philip Hanssen**

Bonus 19: Science (Biology)
Identify these terms related to turning DNA into proteins.
A: In this process, DNA is copied onto mRNA.
B: mRNA and DNA use the same bases, with the exception of this, taking the place of thymine.
C: In this process, mRNA code is used to create a polypeptide.
D: Every group of three mRNA bases is called one of these, each group equivalent to a single amino acid.
Answers: A: **Transcription** B: **Uracil** *(prompt U)* C: **Translation** D: **Codon**

Tossup 20: Math (General) -- Computational (30 Seconds)
Find the value of the expression 3 times the logarithm, base 5, of the quantity 5 to the 4th power times 25 squared. It may help you to know that one property of logarithms allows coefficients and exponents to be converted into each other by multiplication.
Answer: **24**

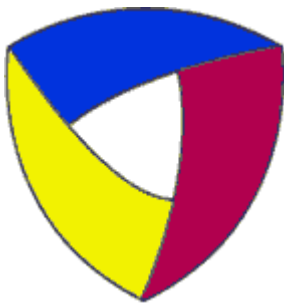
Bonus 20: Literature (Literature)
Given a character from a play by Arthur Miller, name the play.
A: Biff Loman
B: Elizabeth Proctor
C: Joe Keller
D: Abigail Williams
Answers: A: **Death of a Salesman** B: **The Crucible** C: **All My Sons** D: **The Crucible**

TIEBREAKERS/REPLACEMENTS:

Tossup: Science (Chemistry)
His law states that the frequency of the main x-ray emission line is equal to the product of a constant and the sum of the element's atomic number and another constant. This law was extremely significant as it proved that atomic numbers weren't arbitrarily determined, as previously believed. Name this British scientist whose discoveries led to modifications in Dmitri Mendeleev's periodic table.
Answer: **Henry Moseley**

Tossup: Math (Algebra) -- Computational (30 Seconds)
Find the y-coordinate of the inflection point of the function y= x^3 + 9x^2 + 15x + 12.
Answer: **21**

Bonus: Social Studies (World History)
Given a description, name the Portuguese explorer.
A: This man was the first to sail directly to India from Europe.
B: In 1488, this man sailed around the southern tip of Africa, the first modern man to do so.
C: This man, the son of John I, wanted to use Africa to expand the Portuguese economy.
D: This man was the first to circumnavigate the Earth. Well, he would have been had he not been killed in the process.
Answers: A: **Vasco da Gama** B: **Bartolomeu Dias** C: **Prince Henry the Navigator** *(prompt on Henry; accept Henry the Seafearer or Infante Henrique, Duke of Viseu)* D: **Ferdinand Magellan** *(accept Fernao de Magalhaes and Fernando (or Hernando) de Magellanes)*



Ægis Questions

11th IHSSBCA Kickoff, 2006
Round 4

Tossup 1: Literature (Literature)
Her books were burned by the Nazi regime because they were written by a person considered not whole. Because of her great activism for suffrage, peace, and rights, Alabama has placed her on its state quarter. Buried in the National Cathedral of the Episcopalians alongside her most patient companion Annie, name this woman whose story was immortalized in William Gibson's play The Miracle Worker.
Answer: **Helen Keller**

Bonus 1: Social Studies (Other)
Answer these questions about IQ.
A: IQ stands for this, suggesting that it is found by dividing two numbers.
B: This French psychologist created the first modern IQ test, along with Theodore Simon.
C: One of the most popular IQ tests to date, it was a revision of the previous IQ test named in part after a California university.
D: IQ scores are seemingly on the rise worldwide, in a phenomenon known as this effect.
Answers: A: **Intelligence Quotient** B: **Alfred Binet** C: **Stanford-Binet IQ Test** D: **Flynn effect**

Tossup 2: Miscellaneous (Entertainment)
A star athlete, his favorite drink is melonade, and he has starred in several commercials for Fluffy Puff Marshmallows. He always wears a propeller cap, and is somehow able to move objects in front of him, though he doesn't have any visible arms. Name this fictitious athlete coached by Coach Z, possibly in a relationship with Marzipan, and perpetual enemy of Strong Bad, the title character of a popular online Flash cartoon.
Answer: **Homestar Runner**

Bonus 2: Science (Chemistry)
Name these regions of the periodic table of the elements.
A: Boron and silicon are two of this type of element, because they have some characteristics of both metals and nonmetals.
B: Fluorine and chlorine are two of this type of nonmetal, which have seven valence electrons.
C: Beryllium and magnesium are two of this kind of metal, which has two valence electrons.
D: Aluminum and gallium are two of this type of metal, the only elements to the right of the transition metals that are still metals, and which aren't really as bad off as they sound.
Answers: A: **Metalloids** B: **Halogen** C: **Alkaline earth metals** *(do not accept alkali metals)* D: **Poor metals** *(accept post-transition metals)*

Tossup 3: Math (Other) -- Computational (30 Seconds)
When two twenty-sided dice are thrown, there are 400 non-distinct possibilities for the sum of the two dice. What sum is most probable? It may help you to know that, on a table of values, this number spans from one corner to the other.
Answer: **21**

Bonus 3: Literature (Literature)
Name the following characters from Jane Austen's Pride and Prejudice, given a brief description.
A: The story's "single man in possession of a good fortune, who, according to Mrs. Bennet, "must be in want of a wife."
B: The youngest of the Bennet sisters, who impetuously runs off with Wickham.
C: Mr. Bennet's only male heir, an insufferably sycophantic clergyman.
D: Elizabeth Bennet's friend, who marries the answer to part C after Lizzie has refused him.
Answers: A: **Mr. Bingley** B: **Lydia Bennet** C: **Mr. Collins** D: **Charlotte Lucas** *(accept either)*

Tossup 4: Fine Arts (Visual Art)
His early paintings dealt with militaristic subjects and themes, no doubt inspired by the Napoleonic conquests of the time. His later paintings incorporate psychological aspects, as in his The Madman. He will best be remembered for launching the Romantic movement in his mammoth masterpiece, The Raft of the Medusa.
Answer: **Theodore Gericault**

Bonus 4: Math (General)
Calculate the following permutations.
A: 4 P 4
B: 5 P 2
C: 9 P 2
D: 6 P 4
Answers: A: **24** B: **20** C: **72** D: **360**

Tossup 5: Science (Chemistry)
The chrysotile variety was used extensively because of its strength, flexibility, and heat resistance. Charlemagne's tablecloth was said to be made out of this material, so he could clean it by throwing it into a fire. Name this fibrous mineral used in buildings, considered harmful because inhaling it can cause cancer, whose name means "inextinguishable."
Answer: **Asbestos**

Bonus 5: Miscellaneous (Technology)
Answer these questions related to Facebook, a popular social networking website.
A: Every user's profile contains this, where friends can post messages for everyone to see.
B: Users can perform this pointless action on others, which has no effect other than informing the other person that it occurred.
C: Users can write one of these as a sort of blog, or synchronize it with their external blog.
D: Users were in an uproar in early September after this feature was added, allowing them to see all their friends' actions in great detail.
Answers: A: **Wall** B: **Poke** C: **Notes** D: **News feed** *(accept mini-feed)*

Tossup 6: Social Studies (U.S. History)
In the United Kingdom, it is referred to as the Home Department, just as it was in the United States when it was created in 1849. Many of its offices and duties used to be under the control of other departments, such as the Patent Office being part of the State Department and Indian Affairs being part of the War Department. Name this governmental department whose control was passed to Dirk Kempthorne on May 26, 2006, to succeed the resigning Gale Norton.
Answer: **United States Department of the Interior** *(accept Interior Department)*

Bonus 6: Science (Biology)
Identify these phases of mitosis.
A: In this phase, the chromosomes align themselves on a namesake plate in the center of the cell.
B: In this phase, chromatin condenses into chromosomes, and the nuclear envelope dissolves.
C: In this phase, the cell elongates and nuclear envelopes reform.
D: In this phase, the kinetochores shorten, pulling the sister chromatids apart.
Answers: A: **Metaphase** B: **Prophase** *(accept prometaphase)* C: **Telophase** D: **Anaphase**

Tossup 7: Literature (Literature)
Although it is generally considered to be a novel, the author herself thought of it as a collection of short stories, and sections such as “Rules of the Game” have been published separately. Name this story of four mahjongg-playing mothers and their Americanized daughters, by Amy Tan.
Answer: **The Joy Luck Club**

Bonus 7: Social Studies (U.S. History)
Given a war, name the treaty that ended it.
A: Mexican-American War
B: War of 1812
C: Spanish-American War
D: World War I
Answers: A: **Treaty of Guadalupe-Hidalgo** *(Prompt on half the required answer)* B: **Treaty of Ghent** C: **Treay of Paris** D: **Treaty of Versailles** *(ver-SI)*

Tossup 8: Math (General) -- Computational (30 Seconds)
What is the probability of flipping no more than 2 heads out of 5 coins? It may help you to know that there are 6 distinct possibilities for flipping 5 coins, including the 1 out of 32 chance that no heads are flipped.
Answer: **0.5 or one-half**

Bonus 8: Fine Arts (Music)
Name the composers of the following operas.
A: Porgy and Bess
B: Fidelio
C: The Flying Dutchman
D: Amahl and the Night Visitors
Answers: A: **George Gershwin** B: **Ludwig van Beethoven** C: **Richard Wagner** D: **Gian-Carlo Menotti**

Tossup 9: Science (Biology)
They can have many different effects, like activating effector cells, agglutination *(uh-GLU-tin-A-shun)*, or even directly neutralizing the antigens they bind to. Shaped like "Y"s, name this type of large protein in the immune system that identifies foreign objects.
Answer: **Antibody**

Bonus 9: Literature (Literature)
Given a collection of poetry, identify its author:
A: Sonnets from the Portuguese
B: Leaves of Grass
C: Songs of Innocence
D: A Shropshire Lad
Answers: A: **Elizabeth Barrett Browning** *(prompt on Browning, accept Elizabeth Browning)* B: **Walt Whitman** C: **William Blake** D: **A(lfred) E(dward) Housman**

Tossup 10: Social Studies (Geography)
The 17th largest island in the world, it is part of an archipelago that includes Mindoro and Palawan. It is home to one of the best natural ports in East Asia, and was the site of the Cabanatuan prison camp. Identify this final resting place of Ferdinand Magellan, the largest island in the Philippines.
Answer: **Luzon** *(do not accept Philippines)*

Bonus 10: Math (Geometry)
Answer the following questions regarding geometric figures.
A: How many sides does a tridecagon have?
B: How many faces does an icosahedron have?
C: How many edges does a cube have?
D: How many vertices does an octahedron have?
Answers: A: **13** B: **20** C: **12** D: **6**

HALFTIME

Tossup 11: Math (Algebra) -- Computational (30 Seconds)
What is the x cubed term in the expansion of the quantity 2x minus y, close quantity, raised to the sixth power? It may help you to know that six choose three is 20.
Answer: **-160 x^3 y^3** *(negative 160 x cubed y cubed; accept negative 160 y cubed)*

Bonus 11: Literature (Language Arts)
Identify these terms relating to specially-constructed phrases.
A: A phrase that reads the same backwards, like "able was I, ere I saw Elba."
B: Two words or phrases that contain the same letters in different orders, like "George Bush" and "He bugs Gore."
C: A phrase that contains every letter, like "The quick brown fox jumps over the lazy dog."
D: Named after a warden of Oxford who frequently made these mistakes, it refers to switching corresponding sounds in two different words, like "dellow felegates" for "fellow delegates."
Answers: A: **Palindrome** B: **Anagram** C: **Pangram** D: **Spoonerism**

Tossup 12: Fine Arts (Music)
This composer has been so successful that his work is often considered cliché and trite. He owes much to his lyricist, Tim Rice, who has penned lines such as “there's no one like Macavity/ He's broken every human law, he breaks the law of gravity” and “Prove to me that you're divine/ Change my water into wine.” Name this British composer of Evita, Jesus Christ Superstar, Cats, and Joseph and the Amazing Technicolor Dreamcoat.
Answer: **Andrew Lloyd Webber**

Bonus 12: Math (Calculus)
Evaluate the following limits.
A: The limit as x approaches 5, of the quantity 5x cubed minus 2x squared plus 1, all over the quantity x plus 1.
B: The limit as x approaches -4, of the quantity 8x cubed plus 512, all over the quantity 2x plus 8.
C: The limit as x approaches 3 pi over 4, of sine squared of x.
D: The limit as x approaches infinity, of 12x to the thirtieth power over 2x squared.
Answers: A: **96** B: **192** C: **1/2** *(or .5)* D: **infinity** *(prompt on "the limit does not exist")*

Tossup 13: Science (Physics) -- Computational (30 Seconds)
Ignore significant figures. What is the force of sliding friction if an object weighing 400 Newtons is being pushed across a level floor with a force of 200 Newtons, and the floor has a coefficient of sliding friction of 0.1?
Answer: **40 Newtons** *(prompt for units)*

Bonus 13: Miscellaneous (Entertainment)
Give the name of the character who is president in each of these TV shows.
A: West Wing
B: Commander in Chief
C: 24 – Seasons 2 and 3
D: 24 – Seasons 4 and 5
Answers: A: **Josiah Edward “Jed” Bartlett** B: **Mackenzie Allen** C: **David Palmer** D: **Charles Logan**

Tossup 14: Social Studies (Current Events)
According to Rosie O'Donnell, telling her children what happened to him was like telling them that Superman died. His family declined a state funeral, because they said "he would want to be remembered as an ordinary bloke." He was killed on September 4, 2006 while filming a documentary called, ironically, "The Ocean's Deadliest," when a stingray barb pierced his heart. Name this Australian naturalist also known as the Crocodile Hunter.
Answer: **Steve Irwin** *(prompt on Crocodile Hunter)*

Bonus 14: Science (Astronomy)
Name these firsts in space.
A: The name of the first animal in space.
B: The first artificial satellite in space.
C: The first man in space.
D: The first American in space.
Answers: A: **Laika** B: **Sputnik I** C: **Yuri Gagarin** D: **Alan Shepard**

Tossup 15: Literature (Literature)
The title reflects the recurring theme that contrasts the barbaric unknown with the light of civilization. Framed as a story within a story, this novel follows Charlie Marlow as he tells about his past as a ferryboat captain. Name this novel about a young man's journey to find an infamous ivory agent amid the horrors of the Congo, by Joseph Conrad.
Answer: **Heart of Darkness**

Bonus 15: Social Studies (World History) -- Five Parts
The Nazi Concentration Camp Camps used triangles with a single letter inside to identify non-Germans inside the camp. The letter identified the first letter in German. Given the letter identify the European country or nationality of its people.
A: “I”
B: “F”
C: “B”
D: “T”
E: “U”
Answers: A: **Italy OR Italian** B: **France OR French** C: **Belgium OR Belgian** D: **Czechoslovakia OR Czech OR Czechoslovakian** E: **Hungary OR Hungarian**

Tossup 16: Miscellaneous (Sports)
His most famous shot came in 1999 in the PGA Championship at Medinah, when his ball was behind a tree and he had to keep his eyes closed while he swung at the ball. Nicknamed "El Niño" *(el NEEN-yo)*, he finished tied for third at this year's PGA Championship. Name this member of the 2006 European Ryder Cup team, one of the two Spanish golfers to play in the event.
Answer: **Sergio Garcia**

Bonus 16: Fine Arts (Visual Art)
Name the artists who painted the following works.
A: Las Meninas
B: The Expulsion from the Garden of Eden
C: Primavera
D: The Ecstasy of St. Cecilia
Answers: A: **Diego Velasquez** B: **Masaccio** C: **Sandro Botticelli** D: **Raphael Sanzio**

Tossup 17: Math (Geometry) -- Computational (30 Seconds)
A circle is inscribed in a square. What is the ratio of the area of the square to that of the circle?
Answer: **4 over pi** *(do not accept "pi over 4")*

Bonus 17: Science (Biology) -- Three Parts
The DPT vaccine is a common vaccine that protects against three common diseases. Name the three, which begin with D, P, and T.
Answers: *(in no particular order)* A: **Diphtheria** B: **Pertussis** C: **Tetanus**

Tossup 18: Social Studies (World History)
Born in Alimos, he served Athens as a general from 424-423 BC. Exiled from Athens for his failures as a general, he spent the remainder of his career travelling and observing war from both sides. His cynical view of human nature pervades his work, and he is considered the first historian to attempt total objectivity. Identify this chronicler of the Peloponnesian War.
Answer: **Thucydides**

Bonus 18: Literature (Literature)
Given a description, name the work by Roald Dahl.
A: This novel centers around the title character and her magical abilities. Other characters include Miss Honey and Trunchbull.
B: The titular character is with his four grandparents in a house near the title location.
C: This book is the sequel to the answer to Part B, in which the title character travels through space in the title object.
D: In this novel, Sophie is taken away from her dormitory through the window by the title character.
Answers: A: **Matilda** B: **Charlie and the Chocolate Factory** *(do not accept Willy Wonka and the Chocolate Factory)* C: **Charlie and the Great Glass Elevator** D: **The BFG** *(prompt on The Big Friendly Giant)*

Tossup 19: Science (Chemistry) -- Computational (30 Seconds)
What is the pH of a solution with a hydrogen ion concentration of ten moles per liter?
Answer: **-1** *(do not accept 1)*

Bonus 19: Math (Algebra)
Find the sum of the period and amplitude of the following periodic functions.
A: Y equals 3 sine of the quantity 4 pi x, close quantity.
B: Y equals 5 cosine of the quantity 3 x minus 2, close quantity, plus 11.
C: Y equals 10 cosine of the quantity 2 pi x, close quantity, minus 2.
D: Y equals –2 sine of the quantity pi x over 3, close quantity, plus 5.
Answers: A: **7/2** *(3.5)* B: **(15 + 2 pi)/3** *(or 5 + 2 pi over 3)* C: **11** D: **8**

Tossup 20: Literature (Mythology)
Only two humans, Lif and Lifthrasir, will survive by hiding in Hodmimir's Wood. Though the gods know it will come, they are powerless to stop it. Beginning after Fimbulwinter, Loki will be freed from his bindings, and Bifrost will crack as the fire giants walk across it. Name this event from Norse mythology, the battle at the end of the world.
Answer: **Ragnarok**

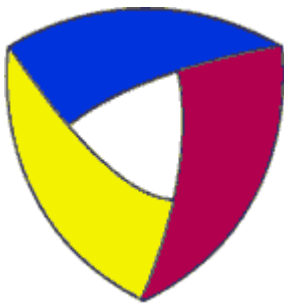
Bonus 20: Social Studies (U.S. History)
Name these Chief Justices of the U.S. Supreme Court.
A: The fourth and longest-serving Chief Justice, he presided over the court from 1801 to 1835.
B: The fifth Chief Justice from 1835 to 1864, he most famously presided over the Dred Scott case.
C: The tenth Chief Justice from 1921 to 1930, he was the only Chief Justice to also serve as President.
D: The fourteenth Chief Justice from 1953 to 1969, he presided over Brown v. Board and a commission to investigate Kennedy's assassination.
Answers: A: **John Marshall** B: **Roger Taney** C: **William Taft** D: **Earl Warren**

TIEBREAKERS/REPLACEMENTS:

Tossup: Social Studies (World History)
It is the common name of AL 288-1. Found on November 30, 1974 in the Afar Depression of Ethiopia, it was brought back to Cleveland, and nine years later was returned to Ethiopia per an agreement with the government of the time. At three feet eight inches and 65 pounds, it was named after a song that was playing during the celebration of the discovery. Identify this famous fossil, the first Australopithecus afarensis *(aw-stra-lo-PITH-a-cus af-a-REN-sis)* skeleton ever to be found.
Answer: **Lucy**

Tossup: Math (Calculus) -- Computational (30 Seconds)
Find the third derivative at x equals one, of the function f of x equals the quantity x minus one, close quantity, over the quantity x plus one. It may help you to use the quotient rule in this situation.
Answer: **3**/**4** *(.75)*

Bonus: Fine Arts (Music)
Identify the composers of the following Romantic compositions. The nationality of the composer has been given, as well.
A: Symphony #9, From the New World; Czech
B: The Bartered Bride; Czech
C: The Girl with the Flaxen Hair; French
D: Lohengrin; German
Answers: A: **Antonin Dvorak** B: **Bedrich Smetana** C: **Claude Debussy** D: **Richard Wagner**



Ægis Questions

11th IHSSBCA Kickoff, 2006
Round 5

Tossup 1: Social Studies (U.S. History)
He considered the most important day of his life to be the day of his baptism and entrance into the Presbyterian Church. His devout beliefs led him to claim that the theory of evolution would lead to immorality in his "The Prince of Peace" speech. In it, he claims that he would not argue against evolution, but he did just that in 1925. Name this man, a member of the prosecution in the Scopes trial, who died 5 days after the trial's conclusion.
Answer: **William Jennings Bryan**

Bonus 1: Math (Algebra)
Expand the following expressions, and give the terms of your answers in order of decreasing degree.
A: (x-11)(x+1)
B: (3x-2)(9x+1)
C: (x+1)(2x-3)(x-7)
D: (x+3)^4
Answers: A: **x^2 - 10x - 11** B: **27x^2 - 15x - 2** C: **2x^3 -15x^2 + 4x + 21** D: **x^4 + 12x^3 + 54x^2 + 108x + 81**

Tossup 2: Science (Biology)
They occur in a few eukaryotes, though they are associated primarily with bacteria. They can be classified as virulent, degrative, or more commonly, the R and F types that confer resistance or fertility, the latter allowing for bacterial conjugation. Name this type of circular DNA strand often used as a vector in genetic engineering.
Answer: **Plasmid**

Bonus 2: Miscellaneous (Technology)
Name these projects of the Wikimedia Foundation.
A: Most famous is this encyclopedia project that has 1.4 million articles in the English version alone.
B: Also popular is this, quote, "collaborative project to produce a free, multilingual dictionary."
C: This project is described as "a free content library" and contains documents like the texts of speeches.
D: In addition to Wikibooks, there is also this related project, quote, "for the creation and use of free learning materials and activities."
Answers: *(only accept these exact names)* A: **Wikipedia** B: **Wiktionary** C: **Wikisource** D: **Wikiversity**

Tossup 3: Literature (Literature)
Published in 1930, one of its chapters consists entirely of, “My mother is a fish.” The length of this chapter is in stark contrast to the rest of the novel, where subjects such as Darl’s incineration of a barn, Dewey’s pregnancy and attempts at abortion, and Anse’s desire for new false teeth are told using the stream of consciousness style the author is famous for. Name this novel by William Faulkner about the Bundren family’s quest to bury their mother, Addie.
Answer: **As I Lay Dying**

Bonus 3: Social Studies (Geography)
Given a country frequently in the news, identify its capital.
A: Iran
B: North Korea
C: Lebanon
D: Sudan
Answers: A: **Tehran** B: **Pyongyang** C: **Beirut** D: **Khartoum**

Tossup 4: Fine Arts (Visual Art)
The placement of the two figures indicates typical gender roles, with the woman by the bed, symbolizing her attachment to the home, while the man stands by the open window and by extension the outside world. Some art historians have challenged the traditional interpretation of the work, claiming that the scene depicts a betrothal and not the ceremony by which it is known. Name this Van Eyck painting.
Answer: **The Arnolfini Wedding**

Bonus 4: Science (Earth Science)
Of Paleozoic, Mesozoic, or Cenozoic, name which geologic era each of the following periods occurred in.
A: Quaternary
B: Permian
C: Jurassic
D: Cambrian
Answers: A: **Cenozoic** B: **Paleozoic** C: **Mesozoic** D: **Paleozoic**

Tossup 5: Math (Algebra) -- Computational (30 Seconds)
x varies directly as y. if y equals 210 when x equals 10, what does y equal when x equals 4?
Answer: **84**

Bonus 5: Literature (Literature)
Given a fictional family, name the author who created it.
A: Tyrone
B: Usher
C: Trask
D: Compson
Answers: A: **Eugene O'Neill** B: **Edgar Allan Poe** C: **John Steinbeck** D: **William Faulkner**

Tossup 6: Social Studies (Other)
Named after another name for the Viracocha, the Incan sun god, it was built in Peru out of balsa wood, and sailed for 101 days from Peru to Polynesia without any modern equipment except for a radio, in an attempt to prove that Polynesia could have been originally settled that way. Name this craft that lends its name to a documentary and a book, sailed by Thor Heyerdahl.
Answer: **Kon-Tiki**

Bonus 6: Fine Arts (Music)
Name the French composers of the following works.
A: Carnival of the Animals
B: Clair de Lune
C: The Sorcerer's Apprentice
D: Trois Gymnopédies
Answers: A: **Camille Saint-Saëns** B: **Claude Debussy** C: **Paul Dukas** D: **Erik Satie**

Tossup 7: Literature (Literature)
This man always wrote in elegiac couplets except in two works, including arguably his most famous one, in which he wrote in dactylic hexameter. In 8 AD he was banished to a city on the Black Sea by Augustus, possibly for writing Ars Amatoria. Name this Roman author of the Art of Love and Metamorphoses.
Answer: **Ovid**

Bonus 7: Math (Calculus)
Find the area under the following curves from x equals zero to x equals two.
A: 5x to the fourth power plus 6x cubed minus 3x squared plus x plus 1.
B: 10x cubed minus 2.
C: 6x squared minus 2x plus 11.
D: 21e to the x power.
Answers: A: **52** B: **36** C: **34** D: **21e squared minus 21** *(or 21 times the quantity e squared minus 1)*

Tossup 8: Science (Astronomy)
It must have enough mass for hydrostatic equilibrium, resulting in a spherical shape. It must also be in orbit around the Sun. Finally, and most controversially, it must have cleared the neighborhood around it. The push for a definition was only successful after the discovery of Quaosar, Sedna, Ceres, and most recently, Eris. Name this astronomical term, of which eight currently exist, for which there was no formal definition before August 24, 2006.
Answer: **Planet**

Bonus 8: Social Studies (World History)
Identify the following events in World War II, based on their operational names.
A: Operation OVERLORD
B: Operation Sea Lion
C: Operation Torch
D: Operation Autumn Mist
Answers: A: **D-Day** *(accept invasion of Normandy)* B: **The Battle of Britain** *(accept "invasion of Britain")* C: **Invasion of North Africa** D: **The Battle of the Bulge**

Tossup 9: Miscellaneous (Sports)
After winning the junior Wimbledon championship in 1997, he turned pro in 1998. His struggles on clay coincide with his struggles against Rafeal Nadal, who has defeated him in the last two French Opens; however, he has not lost a match on a grass court since 2002. Name this Swiss tennis player, who has been ranked number one in the world since February 2004 and has won the past four Wimbledon Men's singles championships.
Answer: **Roger Federer**

Bonus 9: Science (Biology)
Give the names of the membranes that surround each of the following things in the human body.
A: The abdominal cavity
B: The heart
C: Bones
D: The lungs
Answers: A: **Peritoneum** B: **Pericardium** C: **Periosteum** D: **Pleural membrane**

Tossup 10: Math (Other) -- Computational (30 Seconds)
Answer as an exact decimal. Tom is flipping a biased coin which has a 60% chance of flipping heads. What is the probability that Tom will flip exactly 2 heads out of 3 flips?
Answer: **.432**

Bonus 10: Literature (Mythology)
Answer the following questions about the family of Helen of Troy.
A: Who was her mother, whom Zeus visited in the form of a swan?
B: What were the names of her two brothers, jointly called the Dioscuri?
C: Who was her sister, who would later kill her own husband?
D: Who was her husband from whom she fled into the arms of Paris?
Answers: A: **Leda** *(do not accept Leta)* B: **Castor and Pollux** *(accept Polydueces for Pollux)* C: **Clytemnestra** D: **Menaleus**

HALFTIME

Tossup 11: Miscellaneous (Interdisciplinary)
Variations of it appear in the Quran, the Gospel of John, and Arthurian legend, and a park in St. Augustine claims to be home to it. Nathaniel Hawthorne wrote of it in his short story "Dr. Heidegger's Experiment," but it is perhaps best known for its role in the Age of Exploration. Name this mythical spring that drew Ponce de Leon to Florida.
Answer: **Fountain of Youth**

Bonus 11: Math (Other)
If the third Fibonacci number is 2, then find the following Fibonacci numbers.
A: The second
B: The seventh
C: The tenth
D: The twelfth
Answers: A: **1** B: **13** C: **55** D: **144**

Tossup 12: Literature (Language Arts)
Spell the adjective that describes any function that relates to a sine graph. These graphs often correlate to real-life data that shows periodic tendencies. Spell the word sinusoidal *(SIGN-uh-SOY-dull)*.
Answer: **SINUSOIDAL**

Bonus 12: Social Studies (Current Events)
Wal-Mart has been in the news a lot lately. Name these things related to Wal-Mart.
A: Wal-Mart owns this store that sells in bulk, a rival of Costco.
B: The answer to part A shares its name with this founder of Walmart.
C: In September 2006, Wal-Mart made headlines when it announced it would start selling these health products at reduced prices.
D: Earlier this year, Wal-Mart was thought to be the target of this proposed ordinance that stated any stores within the Chicago city limits would have to pay its workers a minimum wage higher than the average one.
Answers: A: **Sam's Club** B: **Sam Walton** C: **prescription drugs** D: **Big Box Ordinance**

Tossup 13: Math (Calculus) -- Computational (30 Seconds)
In slope-intercept form, find the equation of the line tangent to the curve y = x^3 + 4x^2 - 9x + 10 at the point (2,16).
Answer: **y=19x - 22**

Bonus 13: Literature (Literature)
Given a character, name the Dostoyevsky work in which he or she appears.
A: Raskolnikov
B: Prince Myshkin
C: Smerdyakov
D: Svidrigailov
Answers: A: **Crime and Punishment** B: **The Idiot** C: **The Brothers Karamazov** D: **Crime and Punishment**

Tossup 14: Science (Biology)
Titin is the largest one without a quaternary structure, weighing almost three million AMUs. Discovered and named by Berzelius in 1838, this class of molecules has such diverse uses as support structures, hormones, and enzymes. Name this type of macromolecule, a polymer of amino acids.
Answer: **Protein**

Bonus 14: Miscellaneous (Entertainment) -- Five Parts
Identify these similarly themed things from music.
A: This band had US Hot 100 hits with "Paradise City" and "Sweet Child O' Mine".
B: This album's first two tracks are "Taxman" and "Eleanor Rigby".
C: This UK punk band had such hits as "Anarchy in the UK" and "God Save The Queen".
D: This band's debut album, Contraband, included singles such as "Slither" and "Fall to Pieces".
E: The first album Bob Segar recorded with this band, which he is now closely associated with, was Beautiful Loser.
Answers: A: **Guns N' Roses** *(accept GN'R)* B: **Revolver by the Beatles** C: **Sex Pistols** D: **Velvet Revolver** E: **Bob Segar and The Silver Bullet Band**

Tossup 15: Social Studies (U.S. History)
He once remarked to his successor, "If you are as happy entering the presidency as I am in leaving it, then you are truly a happy man." Following his presidency, he published the first presidential memoir. He died June 1, 1868, at the age of 77 at his home, Wheatland. Identify this only president to be a resident of Pennsylvania, the only bachelor president.
Answer: **James Buchanan**

Bonus 15: Science (Physics)
Answer these questions about the dual nature of light.
A: Light usually acts like a wave, as in this famous experiment conducted by Young, that demonstrates interference between two small openings of light.
B: Light can also take the form of this type of particle, the electromagnetic gauge boson.
C: Though the wave nature of light could not explain this phenomenon, thinking of light as a particle explains why a current can be induced on a metal by shining light on it, known as this effect.
D: This man proposed that all particles can have a wave-like nature, relating them with the formula, lambda equals h over mv.
Answers: A: **Double-slit experiment** B: **Photon** C: **Photoelectric effect** D: **Louis-Victor de Broglie**

Tossup 16: Literature (Literature)
After receiving a law degree from the University of Mississippi in 1981, he entered a law practice, where he heard the testimony of a rape victim, giving him the idea for his first novel, A Time to Kill. His second novel, The Firm, was the best-selling novel of 1991. Name this bestselling author of legal thrillers whose most recent book was The Broker, in 2005.
Answer: **John Grisham**

Bonus 16: Fine Arts (Visual Art)
Name the following works by Leonardo da Vinci:
A: This portrait of a rich silk merchant's wife is his most famous work, partly for its use of light and landscape.
B: Set in the dining hall of the monastery Santa Maria delle Grazie, this is Da Vinci's most famous religious painting.
C: This painting, a scene of three kings worshipping the newborn Christ, uses chiaroscuro, a method where figures are only shown through light and dark areas.
D: This scientific sketch demonstrated the proportions of the human body, using squares and circles.
Answers: A: **Mona Lisa** B: **The Last Supper** C: **Adoration of the Magi** D: **Vitruvian Man**

Tossup 17: Fine Arts (Music)
This famous musical opened in 1957 on Broadway, and was subsequently released in 1961 as a movie, winning 11 Oscars including Best Picture. The director and choreographer was Jerome Robbins, the lyricist was Stephen Sondheim, and the composer was Leonard Bernstein. Name this musical that involves gang fights between the American Jets and the Puerto Rican Sharks, and is loosely based on Romeo and Juliet.
Answer: **West Side Story**

Bonus 17: Math (Algebra)
Find the point of intersection from the given lines or curves.
A: 4x+2y=16; and 3x-y=17
B: 2y+3x=10; and x=y
C: x/8 + y/6 = 1.25; and y=2x
D: y=x cubed; and x=log base 3 of 243
Answers: A: **(5,-2)** B: **(2,2)** C: **(30/11,60/11)** D: **(5,125)**

Tossup 18: Science (Chemistry)
First described by Carnot *(car-NOH)* as "lost caloric," Boltzmann quantified it as the logarithm of the number of microstates of a gas. Also used to measure randomness in information theory, name this concept behind the second law of thermodynamics, a measurement of disorder.
Answer: **Entropy**

Bonus 18: Social Studies (U.S. History)
Name the American vice president, given a description.
A: Abraham Lincoln's first vice president, he was one of two vice presidents to have the initials H.H..
B: Much to the chagrin of his party, he challenged Thomas Jefferson for the presidency in 1800. He later killed Alexander Hamilton in a duel.
C: This vice president under Nixon resigned in 1973.
D: The successor to the answer to part C, he became president when Nixon resigned.
Answers: A: **Hannibal Hamlin** B: **Aaron Burr** C: **Spiro Agnew** D: **Gerald Ford**

Tossup 19: Math (General) -- Computational (30 Seconds)
Find the cross product of the two three-dimensional vectors (3, 4, 1) and (2, 1, 6). The cross product returns a vector perpendicular to both vectors, and is the determinant of a matrix whose first row is the unit vectors, and whose other two rows are the original vectors.
Answer: **(23, -16, -5)** *(accept 23i - 16j - 5k)*

Bonus 19: Literature (Literature)
Given a description of a character from Oscar Wilde's The Picture of Dorian Gray, name the character.
A: The artist who paints Dorian Gray's portait.
B: An aristocratic friend of the artist who leads Dorian into sensual depravity.
C: This former friend of Dorian helps him get rid of a corpse.
D: Early in the novel, Dorian falls in love with this actress, who kills herself when Dorian breaks their engagement.
Answers: *(Prompt on first names)* A: **Basil Hallward** B: **Lord Henry Wotton** *(accept Lord Henry)* C: **Alan Campbell** D: **Sybil Vane**

Tossup 20: Social Studies (World History)
Pine trees have been planted to honor the Australian and New Zealand soldiers who died during it. It featured the astounding defensive skills of Mustafa Kemal Ataturk, who beat back the invading forces to successfully defend the Turkish peninsula. Name this 1915 campaign, largely engineered by Winston Churchill, that was unable to capture Constantinople.
Answer: **Gallipoli campaign or the Dardanelles campaign**

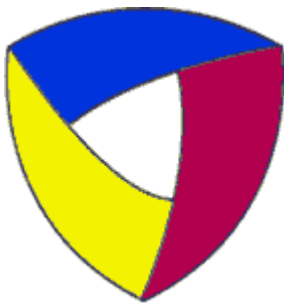
Bonus 20: Science (Chemistry)
Given the atomic symbol, name the element:
A: Sn
B: Pl
C: K
D: Hg
Answers: A: **Tin** B: **Plutonium** C: **Potassium** D: **Mercury**

TIEBREAKERS/REPLACEMENTS:

Tossup: Science (Biology)
It is modeled by the differential equation dP/dt equals r P times the quantity 1 minus P over K, called the Verhulst equation, where P is the population size, r is the rate of growth, and K is the carrying capacity. Name this curve that models the population growth of a species, as a dramatic increase that tapers off as it nears the maximum population size.
Answer: **Logistic growth curve**

Tossup: Social Studies (Other)
Although a moral and social philosopher, he is chiefly remembered for more or less singlehandedly founding classical economics. Name this author of An Inquiry into the Nature and Causes of the Wealth of Nations.
Answer: **Adam Smith**

Bonus: Math (General)
Find the value of the following binary numbers. It may help you to know that four to the fourth power is 256.
A: 101000101
B: 101110111
C: 111111110
D: 101010000
Answers: A: **325** B: **375** C: **510** D: **336**



Ægis Questions

11th IHSSBCA Kickoff, 2006
Round 6

Tossup 1: Math (Geometry) -- Computational (30 Seconds)
Find the area of a triangle with sides of length 5, 7, and 8. It may help to note that the perimeter of the triangle is 20, so the semiperimeter is 10.
Answer: **10√3** *(10 root 3)*

Bonus 1: Social Studies (U.S. History)
Given a group of candidates, name the year of the presidential election.
A: Warren Harding, and Eugene V. Debs who ran from prison
B: Woodrow Wilson, William Taft, Teddy Roosevelt, and Eugene V. Debs
C: Abraham Lincoln and George B. McClellan
D: Samuel Tilden and Rutherford B. Hayes
Answers: A: **1920** B: **1912** C: **1864** D: **1876**

Tossup 2: Literature (Literature)
Her 2002 novel, Caramelo, was influenced by her family's frequent travel between Mexico and the U.S. during her childhood; her Mexican-American heritage has also influenced her short stories and poems. Name the author of Woman Hollering Creek and The House on Mango Street.
Answer: **Sandra Cisneros**

Bonus 2: Science (Biology)
Name these structures related to the brain.
A: This structure connects the two hemispheres of the brain.
B: Meaning "little brain," this region helps motor coordination.
C: The bottom part of the brain stem, it controls autonomic functions like reflexes, breathing, and heartbeats.
D: Meaning "great hole," this hole in the skull is where the brain stem exits the skull to the spinal cord.
Answers: A: **Corpus callosum** B: **Cerebellum** C: **Medulla oblongata** D: **Foramen magnum**

Tossup 3: Miscellaneous (Sports)
A member of the Baseball Hall of Fame and nicknamed The Iron Horse for his durability, he holds the American League record for runs per season, but was forced to retire because of illness in 1939 from amyotrophic *(AM-e-oh-TROH-fick)* lateral sclerosis, or ALS, which is more commonly called his disease. Name this first baseman for the New York Yankees whose career spanned from 1925 to 1939.
Answer: **Lou Gehrig**

Bonus 3: Math (Algebra)
Solve the following equations for x. Give any fractional answers as improper fractions.
A: 4x plus 7 equals 8x minus 3.
B: 6 times the quantity x minus 2, close quantity, equals 5x minus 5.
C: The absolute value of the quantity x plus 7, close quantity, equals 11.
D: 14x plus 9 is greater than 3x minus 35.
Answers: A: **5/2** B: **7** C: **4 and –18** *(must have both in either order)* D: **x > -4**

Tossup 4: Social Studies (U.S. History)
Located on the top three floors of the ten-story Asch Building, its infamous event occurred on March 25, 1911. Long known for its poor treatment of the mostly female workers, the Uprising of 20,000 began here with a walkout of many of the workers. Name this factory that entered history after a fire that started on the eighth floor ended up killing 146 garment workers that could not get down the locked stairways.
Answer: **Triangle Shirtwaist Factory**

Bonus 4: Fine Arts (Music)
Give the number of sharps or flats in each of the following keys.
A: C major
B: B flat major
C: C sharp minor
D: A major
Answers: A: **0 sharps and 0 flats** *(accept either or both)* B: **2 flats** C: **4 sharps** D: **3 sharps**

Tossup 5: Science (Chemistry)
Not occurring in solutions, its presence can indicate particles in as low concentrations as one part per ten million, so long as the particles are larger than the wavelength of the light used. Named after an Irish scientist, name this type of scattering in colloids that makes laser beams visible.
Answer: **Tyndall effect** *(accept scattering before last sentence)*

Bonus 5: Literature (Language Arts)
Identify each of the following poetic feet based on syllables.
A: A long syllable followed by a short syllable.
B: Short followed by long.
C: Short followed by short.
D: Long followed by long.
Answers: A: **Trochee** *(accept choree)* B: **Iamb** C: **Pyrrus** *(accept dibrach)* D: **Spondee**

Tossup 6: Math (Other)
You can never catch up. You can't even start. You can't even move. In essence, those are what the most famous of these statements conclude. Of course, common sense and mathematical limits show otherwise. The stadium, the dichotomy, the arrow, and Achilles and the tortoise, are some of the most famous of what paradoxes, written by a Greek philosopher in the fifth century B.C.?
Answer: **Zeno's paradoxes**

Bonus 6: Science (Astronomy)
Name the Apollo space mission, given a description.
A: The mission that was the first to have humans set foot on the moon.
B: The mission that saw Fred Haise, Jim Lovell, and Jack Swigert abort because of in-flight problems. A movie starring Tom Hanks featured the incident.
C: Roger Chaffee, Gus Grissom, and Edward White were killed when a fire swept through the aircraft during a drill.
D: This mission with astronauts James McDivitt, David Scott, and Rusty Schweickart was the first time a manned Lunar Module flight was used.
Answers: A: **Apollo 11** B: **Apollo 13** C: **Apollo 1** D: **Apollo 9**

Tossup 7: Fine Arts (Visual Art)
Little is known about the life of this painter, whose work is noted for its transparent colors, use of light, and careful composition. He lived in the Catholic section of Delft in Holland with his wife and children. His most famous work was recently the basis for a novel by Tracy Chevalier and subsequent film starring Scarlett Johansson. Name this painter of mostly indoor domestic scenes, best known for Girl With a Pearl Earring.
Answer: **Johannes Vermeer**

Bonus 7: Social Studies (World History)
Identify the following international icons of despotism.
A: This radical Marxist leader of Cambodia led the Khmer Rouge and butchered over a million of his own citizens in the "killing fields".
B: A Turkik Mongol, this man's goal was to make his capital, Samarkand, the most impressive in Asia.
C: Leader of the infamous Committee of Public Safety, he was the mastermind of the Reign of Terror during the French Revolution.
D: This totalitarian leader of the U.S.S.R. persecuted his country's vast number of ethnic groups—reserving particular vitriol for Jews and Ukranians.
Answers: A: **Saloth Sar or Pol Pot** B: **Tamerlane or Timur bin Taraghay Barlas** C: **Maximilien François Marie Isidore de Robespierre** D: **Joseph Vissarionovich Stalin**

Tossup 8: Literature (Mythology)
Some scholars say one of her temples is a tribute to her, but others say it is a tribute to another goddess with the same name. At one point she took over Luna's job, in addition to her own task as the goddess of the hunt. Name this virgin goddess with a temple at Ephesus, the twin sister of Apollo.
Answer: **Diana**

Bonus 8: Math (Calculus)
Find the derivatives of the following functions.
A: 3x to the fourth power plus 11 x cubed minus 10 x squared plus 21 x plus 9.
B: The quantity 3x minus 7, close quantity, times the quantity 2x plus 1.
C: The quantity 9x squared minus 1, quantity squared.
D: 15e to the power of cosine of x.
Answers: A: **12x^3 + 33x^2 - 20x + 21** B: **12x - 11** C: **324x^3 - 36x** D: **-15 sine of x times e to the power of cosine x**

Tossup 9: Social Studies (Current Events)
He is the 90th person to hold his post, and the youngest since Fumimaro Konoe. Chosen as president of the Liberal Democratic Party on September 20 of this year, six days later he was elected as Prime Minister of his country. Name this man, the current Prime Minister of Japan.
Answer: **Shinzo Abe** *(accept Abe Shinzo, prompt on Shinzo)*

Bonus 9: Miscellaneous (Technology)
Name these Google technologies.
A: First announced on April Fool's Day of 2004, this mail client was originally thought to be a hoax.
B: Powered by Keyhole, this downloadable program released in 2004 allows users to see satellite imagery of the entire planet.
C: This Jabber-based instant messaging client was released by Google in August 2005.
D: Behind Google's success is this algorithm named after one of its two founders, that helps prioritize search results.
Answers: A: **Gmail** B: **Google Earth** C: **Google Talk** D: **PageRank**

Tossup 10: Science (Earth Science)
It is classified as intrusive or extrusive, depending on whether it is plutonic or volcanic. Types include mica, olivine, quartz, and feldspar. Name this type of rock formed by cooled magma.
Answer: **Igneous rock**

Bonus 10: Literature (Literature)
Answer these related literature questions.
A: He read his poem "The Gift Outright" at JFK's inauguration.
B: He is the estranged husband of Hester Prynne.
C: This play is about a bar full of alcoholics waiting for salesman Theodore 'Hickey' Hickman.
D: This is a dangerous fictional material that only melts at 114.4 degrees Fahrenheit. It was invented by Kurt Vonnegut for his novel Cat's Cradle.
Answers: A: **Robert Lee Frost** B: **Roger Chillingworth** C: **The Iceman Cometh** D: **Ice-nine**

HALFTIME

Tossup 11: Social Studies (World History)
This man took the family business very seriously. Despite his admirable devotion, he never could get the better of his arrogance. Herodotus said that he went so far as to lash the Hellespont in retribution for a storm, and set up a throne at Salamis, only to watch his navy be destroyed. Identify this son of Darius and failed conqueror of Greece.
Answer: **Xerxes the first**

Bonus 11: Fine Arts (Visual Art)
Name the following artists.
A: This leader of the impressionists painted Water Lilies.
B: This French sculptor, graphic artist, and painter was leader of the Fauvists. He painted The Dinner Table.
C: This American modern artist became famous for his works in which he would drip and pour paint onto canvasses.
D: This Dutch post-impressionist artist is famous for his Portrait of Dr. Gachet and Starry Night.
Answers: A: **Claude Monet** B: **Henri Matisse** C: **Jackson Pollock** D: **Vincent Van Gogh**

Tossup 12: Math (Calculus) -- Computational (30 Seconds)
Using implicit differentiation, find dy/dx in terms of x and y for the function x cubed plus y squared equals five.
Answer: **(-3x^2)/(2y)** *(negative three x squared over two y; accept -3/2 x^2/y, or other equivalent answers)*

Bonus 12: Literature (Literature)
Answer these questions about the circles of hell in The Divine Comedy by Dante.
A: The more common name for Dante's first circle of hell, good pagans and unbaptized babies go here.
B: This dog guards the third circle. He has many heads and a snake for a tail.
C: This river of the Greek underworld surrounds the lower circles of hell.
D: This is the name for the eighth circle of hell, which means "evil ditches" and contains ten different ditches.
Answers: A: **Limbo** B: **Cerberus** C: **Styx** D: **Malebolge**

Tossup 13: Science (Physics)
Their capacity was originally measured in "jars," named after the first one made, called a Leyden jar. Depicted in circuit diagrams as two parallel lines, they consist of two conductive plates separated by an insulator. Name this element of a circuit that stores charge, whose capacity is measured in farads.
Answer: **Capacitor** *(accept condenser)*

Bonus 13: Social Studies (Geography)
Name these cities, among the most populous in the world, given a brief description.
A: Mumbai was ranked first in a 2005 estimate of the most populous cities; this other Indian city came in at number three.
B: This city's population is calculated in reference to the Distrito Federal.
C: It beat its fellow Brazilian city by over 4 million residents.
D: This Nigerian city is the most populous one in Africa.
Answers: A: **Delhi** *(do not accept New Delhi)* B: **Mexico City** C: **Sao Paulo** D: **Lagos**

Tossup 14: Miscellaneous (Entertainment)
The younger brother of Isaac Slade, this band's lead singer, was cast in a music video set at a school for one of their hit songs. Based out of Denver, they released two CDs in 2003, named "Reason" and "Movement." One of their songs, subtitled "Cablecar," made it to number 8 on the Billboard Top 100, and was featured on the album "How to Save a Life," which was released in 2005. Name this band, best known for the song "Over My Head."
Answer: **The Fray**

Bonus 14: Math (Other)
Convert the following numbers into the specified bases. *(Read digits in question separately.)*
A: 1042 base seven into base two
B: 10010 base three into base five
C: 649 base ten into base six
D: 1100 base two into base ten
Answers: A: **1 0 1 1 1 0 1 0 1** B: **3 1 4** C: **3 0 0 1** D: **1 2**

Tossup 15: Literature (Literature)
Written in 1785, this poem is mainly known because many composers have set it in music. Schubert and Tchaikovsky wrote versions of it, though more famous is another one, set for orchestra, chorus, and four solo voices. Name this German poem by Friedrich Schiller, used at the end of Beethoven's Ninth Symphony.
Answer: **Ode to Joy**

Bonus 15: Science (Chemistry) -- Three Parts
There are three main definitions of acids, all named after the scientists that discovered them.
A: According to this definition named after a Swedish chemist, an acid donates hydrogen ions to an aqueous solution.
B: According to this definition named after two scientists, an acid is a proton donor.
C: According to this definition named after the man who invented a dot structure representation of valence electrons, an acid is an electron-pair acceptor.
Answers: A: **Arrhenius** B: **Bronsted-Lowry** C: **Lewis**

Tossup 16: Social Studies (U.S. History)
Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism Act of 2001. That's its real name, though it commonly goes by the acronym. Passed 98 to 1 by the Senate in 2001 and renewed in March 2006, name this nationalist-sounding law that amends many other laws to make it easier for America to combat terrorism.
Answer: **USA PATRIOT Act**

Bonus 16: Miscellaneous (Sports)
Name the following hockey teams based on information from their last Stanley Cup championship. You must provide both the location and team name.
A: This team won the President's Trophy for most regular season standings points en route to winning the 2002 cup. Nicklas Lidstrom won the Conn Smythe trophy and it was Steve Yzerman's *(eyes-er-man)* third and final Stanley Cup.
B: This team has won five cups in their history, their last coming in 1990 where they defeated the Wayne Gretzky-led Kings in the Conference Semifinals and the Boston Bruins in the Stanley Cup Finals.
C: This team defeated the team in question 2 in the 2006 Stanley Cup. They were led by rookie goaltender Cam Ward and captain Rod Brind'Amour.
D: This team, owned by Texas Rangers owner Tom Hicks, beat the Buffalo Sabres on a controversial Brett Hull goal in 1999 for the team's only Stanley Cup.
Answers: *(Prompt on any answer of only city or only team name.)* A: **Detroit Red Wings** B: **Edmonton Oilers** C: **Carolina Hurricanes** D: **Dallas Stars**

Tossup 17: Fine Arts (Music)
This opera has four different overtures, including Leonore #3, which is sometimes played in between acts. The title character is a servant to Rocco, the head jailer, whose daughter is enamored with him. Unfortunately, this man is actually Leonore in disguise, who is trying to rescue her husband Florestan. Name this opera, the only one composed by Beethoven.
Answer: **Fidelio**

Bonus 17: Literature (Literature)
1929 was a remarkable year for literature. Given the description of a work written in 1929, name this work.
A: This Thomas Wolfe novel, his first, was dedicated to his wife, Aline Bernstein. Characters include Eugene and Ben Gant.
B: This William Faulkner work had its title taken from a line in Macbeth. Two of its narrators are Benjy and Quentin Compson.
C: This novel centers around Frederic Henry, an ambulance driver in World War I, and Catherine Barkley. It was written by Ernest Hemingway.
D: This protagonist of this work by Erich Remarque *(ray-MARK)* is Paul Baumer *(bow-MEHR)*.
Answers: A: **Look Homeward, Angel** B: **The Sound and the Fury** C: **A Farewell to Arms** D: **All Quiet on the Western Front**

Tossup 18: Math (Algebra) -- Computational (30 Seconds)
Find the sum of the infinite geometric series whose first three terms are 20, 15, and 11.25.
Answer: **80**

Bonus 18: Social Studies (U.S. History)
Name these famous ships from American history.
A: A battleship of the Pennsylvania class, it was sunk on December 7th, 1941. There is now a memorial dedicated to it at Pearl Harbor.
B: The explosion of this ship in 1898, the true cause of which is still unknown, helped start the Spanish-American War.
C: This ship was the first ever Ironclad commissioned by the United States Navy. It battled the CSS Virginia, and was lost at sea in 1862.
D: This former slaveship captained by John Paul Jones defeated the Serapis.
Answers: A: **USS Arizona** B: **USS Maine** C: **USS Monitor** D: **USS Bonhomme Richard** *(Prompt on half of required answer)*

Tossup 19: Science (Biology)
It consists of four porphyrin *(PORE-fur-in)* groups, each with four nitrogens acting as ligands to a central iron atom. Name this macromolecule that can also carry oxygen atoms, a major component of red blood cells.
Answer: **Hemoglobin**

Bonus 19: Math (General)
Find the square root of each of the following numbers.
A: 1,089
B: 1,764
C: 2,916
D: 11,025
Answers: A: **33** B: **42** C: **54** D: **105**

Tossup 20: Literature (Literature)
Sections of it were printed in a magazine in 1847 and 1848, and the title was taken from John Bunyan's Pilgrim's Progress. Its subtitle is "A Novel Without a Hero," and the first scene is set at Miss Pinkerton's Academy for Young Ladies. Name this novel that includes the characters Amelia Sedley and Becky Sharp, written by William Thackeray.
Answer: **Vanity Fair**

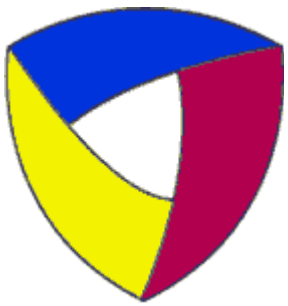
Bonus 20: Science (Physics)
Given the units of a physical quantity from classical mechanics, name the quantity. For example, if I say kilograms, you say mass.
A: Meters per second squared
B: Ohms
C: Newton meters
D: Watt
Answers: A: **Acceleration** B: **Resistance** C: **Torque** *(accept work or energy)* D: **Power**

TIEBREAKERS/REPLACEMENTS:

Tossup: Literature (Literature)
15% of the US male population is over six feet tall, yet roughly 58% of CEOs of Fortune 500 companies are. A gambler will sweat in reaction to a risky bet before he is consciously aware of the risk. These observations are recorded in what 2005 book by the author of The Tipping Point? Identify the book that spent 41 weeks on the New York Times bestseller list subtitled “The Power of Thinking Without Thinking,” and written by Malcolm Gladwell.
Answer: **Blink: The Power of Thinking Without Thinking**

Tossup: Science (Physics) -- Computational (30 Seconds)
A tube with two closed ends has radius 6 inches, length 12 inches, and frequency 600 hertz. What is the length of a tube with two closed ends that has a radius 9 inches and frequency 48 kilohertz?
Answer: **1.5 inches** *(prompt for units)*

Bonus: Science (Chemistry)
Answer these questions about ways to speed up chemical reactions.
A: Increasing this can speed up reactions, because it causes molecules to move faster and collide more often.
B: Increasing this can also speed up reactions, by making particles more likely to collide by decreasing the average distance between particles.
C: Another way to speed up a reaction is to add this type of compound that increases the rate of particular reactions.
D: Using such an added compound to increase the reaction rate doesn't add energy to the molecules; instead, it decreases the amount of energy needed for a reaction to occur, a quantity known as this.
Answers: A: **Temperature** B: **Concentration** *(accept pressure)* C: **Catalyst** D: **Activation energy**



Ægis Questions

11th IHSSBCA Kickoff, 2006
Round 7

Tossup 1: Fine Arts (Visual Art)
Contrary to popular conception, the title refers not to an action by the central figure but to the infinite cry of nature, to which the figure is responding. The artist created multiple versions of the painting, one of which was stolen in 2004. Name this iconic work by Edward Munch *(MOONK)*.
Answer: **The Scream**

Bonus 1: Science (Physics)
You have two resistors, with resistance 3 and 9 ohms.
A: What is their total resistance if connected in series?
B: What is their total resistance if connected in parallel?
C: If the 3 ohm resistor has a 2 ampere current running through it, what is the voltage across the resistor?
D: If the 9 ohm resistor has a potential difference of 13.5 volts across it, what is the current running through it?
Answers: A: **12 ohms** B: **2.25 ohms** *(or 2 1/4 or 9/4)* C: **6 volts** D: **1.5 amperes**

Tossup 2: Social Studies (World History)
His war diaries were published as 'Infantry Attacks' in 1937. He was very popular with the people of his country and with those of other countries, even during wartime. He was known widely for his chivalry towards his opponents, even going so far as to disobey a 1942 order stating that all Allied commandos be executed immediately, even if they attempted to surrender. This man was considered a genious tank commander and showed this off with his appointment to Libya and his creation of the German Afrika Korps. Identify this man who earned his nickname there: "The Desert Fox".
Answer: **Erwin Johannes Eugen Rommel**

Bonus 2: Math (General)
Evaluate the following expressions.
A: Twelve factorial divided by nine factorial.
B: The hexadecimal expression A1 plus B9. Express your answer in decimal form.
C: The log base four of 4096.
D: Five to the third power multiplied by four to the third power.
Answers: A: **1320** B: **346** C: **6** D: **8000**

Tossup 3: Math (Algebra) -- Computational (30 Seconds)
Jimmy bikes 24 miles and then jogs 24 miles, which takes him 9 hours in total. If Jimmy bikes twice as fast as he jogs, how fast does he jog?
Answer: **4 miles per hour** *(prompt for units)*

Bonus 3: Social Studies (U.S. History)
"You have the right to remain silent."
A: The accused have rights beginning with that sentence, which were established in this landmark 1966 Supreme Court case.
B: In that case, the namesake plaintiff was accused of this crime, which he confessed to, without knowing he didn't have to.
C: "If you cannot afford an attorney, one will be provided to you at no cost." That right was affirmed in this landmark 1963 Supreme Court case.
D: In this 1940 Supreme Court case, three black men convicted for murder were acquitted because they were held for a week without access to a lawyer, and coerced to confess.
Answers: A: **Miranda v. Arizona** *(prompt on Miranda)* B: **Rape** *(accept kidnapping)* C: **Gideon v. Wainwright** D: **Chambers v. Florida**

Tossup 4: Miscellaneous (Entertainment)
Born in 1943, this British actor joined the Royal Shakespeare Company in London in 1966, and had his movie debut in the 1972 movie Fear is the Key. He has appeared in many English and American films since then, and in 2002, was knighted by Queen Elizabeth II. Name this actor who won the 1982 Academy Award for Best Actor for his performance as Mohandas Gandhi.
Answer: **Sir Ben Kingsley** *(accept Krishna Bahji)*

Bonus 4: Literature (Literature)
Given the first line and the author, name the novel.
A: "Last night I dreamt I went to Manderley again." It was written by Daphne du Maurier.
B: "It was love at first sight." It was written by Joseph Heller.
C: "It was the best of times, it was the worst of times." It was written by Charles Dickens.
D: "Call me Ishmael." It was written by Herman Melville.
Answers: A: **Rebecca** B: **Catch-22** C: **A Tale of Two Cities** D: **Moby Dick**

Tossup 5: Science (Biology)
Flatworms don't have one at all, roundworms have a false one, and segmented worms have a true one. Name this biological feature, a fluid filled space surrounding the organs, also known as a body cavity.
Answer: **Coelom** *(pronounced SEE-lum or KOH-lum; accept body cavity on early buzz)*

Bonus 5: Social Studies (Geography)
Name the Canadian province given its capital.
A: Edmonton
B: Toronto
C: Halifax
D: Regina
Answers: A: **Alberta** B: **Ontario** C: **Nova Scotia** D: **Saskatchewan**

Tossup 6: Literature (Literature)
Its subtitle is "A Tragicomedy in Two Acts," and it was originally published in French. In it, the two main characters, Vladimir and Estragon, complain about many things throughout the titular action. Name this play by Samuel Beckett, also featuring Pozzo and Lucky, where two people wait for someone who never comes.
Answer: **Waiting for Godot**

Bonus 6: Miscellaneous (Sports)
Name the Major League Baseball team, both by city and team name, that played under the following managers. All managers are listed in chronological order, though they may not have immediately followed each other.
A: Billy Martin, Lou Pinella, Buck Showalter
B: Frank Chance, Johnny Evers, Joe Tinker
C: Casey Stengel, Bobby Valentine, Art Howe
D: Ty Cobb, Sparky Anderson, Alan Trammell
Answers: A: **New York Yankees** B: **Chicago Cubs** C: **New York Mets** D: **Detroit Tigers**

Tossup 7: Science (Earth Science)
It is uniform and spongy, unlike its precursors which still contain visible plant material. Created either naturally or in compost piles, name this kind of soil that cannot break down any more than it already has, and whose name sounds like a Middle Eastern food.
Answer: **Humus**

Bonus 7: Fine Arts (Visual Art)
Name the early Renaissance painters of the following works.
A: The Garden of Earthly Delights
B: The Ghent Altarpiece
C: The Ambassadors
D: The Holy Trinity
Answers: A: **Hieronymous Bosch** B: **Jan van Eyck** C: **Hans Holbein the Younger** *(prompt for Younger, do not accept Elder)* D: **Masaccio** *(accept Tommaso Cassai)*

Tossup 8: Math (General) -- Computational (30 Seconds)
A quizbowl tournament uses one moderator and one assistant per match, paying moderators 15 dollars per match, and assistants 5 dollars per match. In the tournament, 30 teams play 5 matches each in the morning, followed by a 16-team single elimination playoff. What is the total cost of staffing for the tournament? Once a team is eliminated, they do not play any more matches.
Answer: **1800 dollars**

Bonus 8: Literature (Literature)
Identify the authors who created each of the following literary settings.
A: Narnia
B: Grover's Corners, New Hampshire
C: Brook Farm, Massachusetts
D: Wessex
Answers: A: **C.S. Lewis** B: **Thornton Wilder** C: **Nathaniel Hawthorne** D: **Thomas Hardy**

Tossup 9: Literature (Literature)
This book is narrated by Jim Burden, who tells the stories of several immigrant families who move to Nebraska, especially the Shimerda family and its eldest daughter, whose name is accented on the first syllable. Name this final book in a trilogy with The Song of the Lark and O Pioneers!, a classic novel by Willa Cather.
Answer: **My Antonia**

Bonus 9: Math (Algebra)
Convert the number 87 base ten into each of the specified bases.
A: Base 2
B: Base 3
C: Base 7
D: Base 16
Answers: A: **1010111 base 2** B: **10020 base 3** C: **153 base 7** D: **57 base 16**

Tossup 10: Social Studies (Geography)
Its current president is Juan Jose Ibarretxe *(pron: ee-bar-RET-zay)*, whose first language is not that of his region. That language is Euskera, which is completely different from that of the rest of the country. The terrorist group Eta *(EH-tuh)* has been promoting independence for it, and initially took responsibility for the March 11, 2004 train bombings in Madrid. Name this tiny region of northern Spain.
Answer: **País Vasco** *(py-EES VAHS-co) (Accept Basque Country)*

Bonus 10: Science (Chemistry)
Answer these questions related to acids and bases.
A: This type of substance can act as an acid or a base, like water.
B: A solution made of a weak acid and its conjugate base, it is able to resist small changes in pH.
C: pH and pOH always add up to this number, twice the pH of pure water.
D: This equation can find the equilibrium pH of a reaction, and describes pH in terms of the acid dissociation constant and relative concentrations of the acid and conjugate base.
Answers: A: **Amphoteric** B: **Buffer** C: **14** D: **Henderson-Hasselbalch equation**

HALFTIME

Tossup 11: Science (Chemistry)
A receptor antagonist of adenosine in the brain, it acts as a diuretic and increases epinephrine *(ep-in-EFF-rin)* levels, causing an increased heart rate. Many people have about 100 to 200 milligrams every morning. Name this stimulant found in Vivarin, soda, and coffee, that keeps people awake.
Answer: **Caffeine**

Bonus 11: Science (Biology)
Given the chemical name of a vitamin, give its shorter common name. For example, if I say retinol, you say Vitamin A.
A: Thiamine *(THIGH-a-min)*
B: Folic acid
C: Tocopherol *(toh-COH-fer-awl)*
D: Ascorbic acid *(uh-SOR-bic)*
Answers: A: **Vitamin B1** *(prompt B)* B: **Vitamin B9** *(prompt B)* C: **Vitamin E** D: **Vitamin C**

Tossup 12: Math (Other)
It is probably the most proved theorem in mathematics, with at least 370 separate proofs, including one by James Garfield. It is generalized by Parseval's identity to any pairwise orthogonal vectors, or by the Law of Cosines to any type of triangle. Name this theorem, often visualized as one square on each side of a right triangle, that states that "a" squared plus "b" squared equals "c" squared.
Answer: **Pythagorean theorem** *(accept Gougu theorem)*

Bonus 12: Literature (Literature)
Given a pair of titles, identify their Russian author:
A: Anna Karenina, and War and Peace
B: A Sportsman's Notebook, and Fathers and Sons
C: The Inspector General, and The Nose
D: The Captain's Daughter, and Eugene Onegin
Answers: A: **Leo Tolstoy** B: **Ivan Turgenev** C: **Nikolai Gogol** D: **Alexander Pushkin**

Tossup 13: Literature (Literature)
Its author got its title from a message scrawled in the bathroom of a bar; that title refers to the combination of high culture and childish cruelty that characterizes the interaction of the two main characters. An unflattering portrait of married life, name this play by Edward Albee whose title wonders if anyone is frightened by the author of Mrs. Dalloway.
Answer: **Who's Afraid of Virginia Woolf?**

Bonus 13: Social Studies (World History)
Identify the following international icons of despotism.
A: He organized his supporters, the Blackshirts, into a "March on Rome" that resulted in his installation as Prime Minister.
B: Brutal authoritarian president of Uganda, who called himself "Conqueror of the British Empire".
C: This man established the People's Republic of China in 1949, and ruled until his death in 1976.
D: This dictator of Haiti deliberately modeled his image on that of the voodoo spirit of death Baron Samedi in order to keep the rural population of his island in fear.
Answers: A: **Benito Mussolini** B: **Idi Amin** C: **Mao Zedong or Tse-tung** *(prompt on Zedong or Tse-tung)* D: **François "Papa Doc" Duvalier** *(prompt on "Papa Doc")*

Tossup 14: Literature (Literature)
In her penultimate appearance, she sings first of a dead love, then of a broken promise made by a lover. Her brother enters soon after she stops singing, and he demands revenge for the death of their father, Polonius. The death is but a part of the madness racking the mind of this sister of Laertes. Name this love interest of Polonius' murderer, Hamlet.
Answer: **Ophelia**

Bonus 14: Fine Arts (Music)
Name these ballets by Igor Stravinsky.
A: Subtitled "Pictures from Pagan Russia," it caused riots at its premiere in Paris due to its unconventional music.
B: In this ballet, Prince Igor meets a mythical creature in the magical realm of Kashchei.
C: This ballet takes place at Shrovetide, when the titular puppet is brought to life by a wizard.
D: This one-act ballet is a fable named after the titular fox who gets punished for her trickery.
Answers: A: **The Rite of Spring** B: **The Firebird** C: **Petrushka** D: **Reynard**

Tossup 15: Social Studies (U.S. History)
It was ratified in 1795, because of some dissenting opinions about Article 3, Section 2 of the U.S. Constitution. The case leading to its passage began in 1792, when the executor of Robert Farquhar's estate, Alexander Chisholm, sued the state of Georgia, but Georgia claimed that it could not be sued. Name this amendment that modified the jurisdiction of federal courts.
Answer: **Eleventh Amendment**

Bonus 15: Miscellaneous (Interdisciplinary)
Only four people have won two Nobel Prizes.
A: This man is the only person to be awarded two unshared prizes, one in Chemistry for his bond theory, and one in Peace for activism against nuclear testing.
B: This woman won the 1903 prize in Physics for discovering radioactivity, and the 1911 prize in Chemistry for isolating radium.
C: This man won the 1958 prize in Chemistry for discovering the structure of insulin, and the 1980 prize in Chemistry for his work sequencing viral DNA.
D: This man won the 1956 prize in Physics for inventing the transistor, and the 1972 prize in Physics for work on superconductors.
Answers: A: **Linus Pauling** B: **Marie Curie** C: **Frederick Sanger** D: **John Bardeen**

Tossup 16: Miscellaneous (Technology)
In efforts to address vulnerabilities, the network stack was rewritten, and only signed drivers can be loaded. The new user interface is known as Aero Glass, though there are concerns it is too processor-intensive. Its formal name was announced in July 2005, and its release date has been pushed back many times, most recently to January 2007. Name this version of Microsoft's operating system to be released in a few months, formerly known as Longhorn.
Answer: **Microsoft Windows Vista** *(prompt partial answers; prompt Longhorn)*

Bonus 16: Social Studies (U.S. History)
Given the full maiden name of a U.S first lady, name the president to whom she was married.
A: Sarah Childress
B: Edith Bolling Galt
C: Bess Wallace
D: Betty Bloomer Warren
Answers: A: **James K. Polk** B: **Woodrow Wilson** C: **Harry Truman** D: **Gerald Ford**

Tossup 17: Science (Physics)
First described in 1879, they are very conductive, and can be controlled by electromagnetic fields. Unlike gases, they contain cations *(CAT-i-ons)*, electrons, and neutral compounds. Found in stars and St. Elmo's fire, name this fourth phase of matter like a gas with ionized particles.
Answer: **Plasma**

Bonus 17: Literature (Mythology)
Name these gods of Norse mythology.
A: The god of mischief, he is the father of Jormungandr *(JOR-mun-GAHN-dur)*, Fenrir, and Hel.
B: The chief god, he rides Sleipnir, an eight-legged horse.
C: Son of Jord and the chief god, he is the god of thunder.
D: The second son of the chief god, he was killed by a magical spear made of mistletoe.
Answers: A: **Loki** B: **Odin** *(accept Wotan)* C: **Thor** D: **Baldr**

Tossup 18: Fine Arts (Music)
This Romantic composer invented Ballades *(buh-LAHDS)*, and was the first to write scherzos as individual pieces. He is also known for his twenty four etudes *(AY-tudes)* written for the piano. Name this Polish and French composer who was married to French writer George Sand, and whose most famous compositions include the Minute Waltz and his Funeral March sonata.
Answer: **Frédéric François Chopin**

Bonus 18: Math (Geometry)
Find the degree measure of an interior angle of each of the following regular polygons.
A: Hexagon
B: Decagon
C: 15-gon
D: Icosagon *(i-COS-a-gon)*
Answers: A: **120 degrees** B: **144 degrees** C: **156 degrees** D: **162 degrees**

Tossup 19: Social Studies (Other)
Meaning "The Island," it has an estimated 50 million viewers, and plans to start an English-language channel to add to that number. Started in 1996, it still receives funding from the emir of Qatar, and was reportedly paid $20,000 per minute for footage of a speech by Osama bin Laden. Name this Doha-based Arabic television channel.
Answer: **Al Jazeera**

Bonus 19: Math (Calculus)
Name these calculus-related descriptions of functions.
A: If the derivative of the function f exists everywhere, f is said to be this.
B: If for every c, f of c is defined, and the limit of f as x approaches c, is equal to f of c, f is said to be this.
C: If the function can be differentiated an infinite number of times, the function is said to be this.
D: If a function is of one variable, and composed of a finite number of only constants, exponentials, logarithms, trigonometric functions, and addition, subtraction, multiplication, and division, it is said to be this.
Answers: A: **Differentiable** B: **Continuous** C: **Smooth** D: **Elementary**

Tossup 20: Math (Calculus) -- Computational (30 Seconds)
Including a constant of integration, find the indefinite integral of the natural log of x, dx. This can be done by integration by parts, taking ln x as the first function and dx as the second, and knowing that the derivative of ln x is one over x.
Answer: **x ln(x) - x + C** *(x times the natural log of x, minus x, plus C; accept - x + x ln(x) + C)*

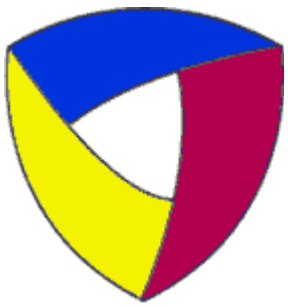
Bonus 20: Science (Astronomy)
Name these terms from astronomy.
A: A region in space-time with such a strong gravitational field that nothing in it can escape to the rest of the universe.
B: Two objects that orbit a center of mass that is within neither object, so neither can be said to orbit the other.
C: If a white dwarf gathers hydrogen gas from a nearby star, it may cause a nuclear explosion called this.
D: From the Latin for "mist," this is a cloud of plasma, gas, and dust. Some named ones include the Crab and Hourglass.
Answers: A: **Black hole** B: **Binary system** C: **Nova** *(do not accept supernova)* D: **Nebula**

TIEBREAKERS/REPLACEMENTS:

Tossup: Literature (Literature)
Its author had trouble publishing this novel because it shows a girl who, upon traveling from the country to the city, gets ahead through a life of sin rather than hard work and ultimately is rewarded for her immorality. Name the novel by Theodore Dreiser.
Answer: **Sister Carrie**

Tossup: Math (Calculus) -- Computational (30 Seconds)
Find the absolute value of the difference between f of 2 and f prime of 2, where f of x equals 3x squared plus 11x minus 10. Remember to disregard a negative sign if your answer has one.
Answer: **1** *(do not accept negative 1)*

Bonus: Literature (Language Arts)
Correctly spell the following words.
A: Liquefy *(LIK-wi-FY)*
B: Phloem *(FLOW-um)*
C: Sesquipedalian *(SES-kwi-pih-DAY-lee-un)*
D: Firkin *(FUR-kin)*
Answers: A: **LIQUEFY** *(accept LIQUIFY)* B: **PHLOEM** C: **SESQUIPEDALIAN** D: **FIRKIN**



Ægis Questions

11th IHSSBCA Kickoff, 2006
Round 8

Tossup 1: Math (Calculus) -- Computational (30 Seconds)
Find dy/dx in terms of t, for the parametric curve defined by x equals t squared plus three, and y equals the sine of the quantity two t squared. This problem can be solved by recalling that dy/dx is equal to dy/dt divided by dx/dt.
Answer: **2 cos(2t^2)** *(two times the cosine of two t squared)*

Bonus 1: Literature (Literature)
Name the German authors of the following works.
A: The Magic Mountain
B: The Tin Drum
C: William Tell
D: The Sorrows of Young Werther
Answers: A: **Thomas Mann** B: **Gunter Grass** C: **Friedrich von Schiller** *(do not accept Rossini)* D: **Johann Wolfgang von Goethe**

Tossup 2: Social Studies (World History)
Commissioned in 1940, this vessel spent its short life as a commerce raider in the Atlantic Ocean. Named for a famous politician, it was so powerful, that Hitler ordered it be referred to as "he," rather than the customary "she." The flagship of the German Kriegsmarine, *(pron. KREEGS-muh-reen)* this ship sank the British battlecruiser Hood before meeting its own end at the hands of the Prince of Wales and Repulse. Identify this German battleship, sister ship of the Tirpitz.
Answer: **Bismarck**

Bonus 2: Math (Calculus)
Find the second derivatives of the following functions at the specified points.
A: 24t squared minus 2 at t equals 3.
B: 12t cubed plus 11t squared minus 3t plus 10, at t equals 5.
C: 20 sine of 2t, at t equals 3 pi over 2.
D: 3 tangent of t, at t equals pi over 4.
Answers: A: **48** B: **382** C: **0** D: **12**

Tossup 3: Science (Chemistry)
With an atomic mass of about 24.31, it is often used in white fireworks, and was previously used as flash powder in photography. Its hydroxide is used as a common antacid, and its hydrated sulfate, called epsom salt, is used for many other medical purposes. Its primary use, however, is in an alloy with aluminum. Name this chemical element with atomic number 12, an alkaline earth metal with symbol Mg.
Answer: **Magnesium**

Bonus 3: Miscellaneous (Sports)
A well known American tennis player retired this past year after a lengthy career. Answer the following related questions.
A: Name that player, who won eight Grand Slam titles, including the career Grand Slam, and an Olympic gold medal. He declared his retirement effective after this year's U.S. Open.
B: The player and his first round opponent share first names. Name that opponent, who was ranked 77th in the world and was defeated in four sets.
C: His second round opponent was the runner up at this year's Australian Open and a semifinalist at this year's Wimbledon. This match went to five sets and after midnight local time.
D: His third round opponent, the 2004 NCAA Men's Singles champion, defeated him in four sets. Andy Roddick then defeated him in the fourth round.
Answers: A: **Andre Agassi** B: **Andrei Pavel** C: **Marcos Baghdatis** D: **Benjamin Becker**

Tossup 4: Literature (Literature)
The protagonist takes a job as a bell boy at a hotel but is forced to flee westward. Upon returning to New York, he takes a job in a factory where he seduces Roberta Alden, who he eventually murders when he doesn't rescue her from drowning. Name this novel by Theodore Dreiser, based on the real life murder of Grace Brown by Chester Gillette.
Answer: **An American Tragedy**

Bonus 4: Social Studies (Other) -- Five Parts
Name, in any order, the five fundamental tenets known as the Pillars of Islam. Use the English description rather than the Arabic term.
Answers: *(accept clear-knowledge equivalents)* A: **Declaration of faith** B: **Prayer** C: **Charity/giving alms** D: **Fasting during Ramadan** E: **Pilgrimage to Mecca**

Tossup 5: Math (General)
Named in 1975, these figures have Hausdorff dimensions larger than their topological dimensions, leading to strange properties, like the infinite perimeter but finite area of a Koch snowflake. Other types include the Brownian tree, Sierpinski carpet and triangle, and Julia set. Name these self-similar geometric objects whose name comes from the Latin for "broken," coined by Benoit *(ben-WAH)* Mandelbrot *(MAN-del-BRAHT)*.
Answer: **Fractal**

Bonus 5: Fine Arts (Visual Art)
Like world-class soccer players, Renaissance artists are frequently known on a one-name basis. Given the last name or family name, give their first or common name.
A: di Lodovico Buonarotti
B: Vecelli or Vecellio
C: Sanzio or Santi
D: di Nicolo di Betti Bardo
Answers: A: **Michelangelo** B: **Titian** *(or Tiziano)* C: **Raphael** D: **Donatello**

Tossup 6: Social Studies (Geography)
Its flag features green and red horizontal stripes, with the red being larger, and an ornamental pattern charged at the hoist. While this country's name actually means "White Ruthenia," it is often mistranslated as "White Russia," which is an area of eastern Europe that it does not inhabit. Bordering Latvia, Lithuania, Poland, Russia, and Ukraine, this country's capital and most populous city is Minsk.
Answer: **The Republic of Belarus**

Bonus 6: Science (Earth Science)
Given a mineral, state its hardness according to the Mohs scale.
A: Diamond
B: Talc
C: Feldspar
D: Corundum
Answers: A: **10** B: **1** C: **6** D: **9**

Tossup 7: Literature (Literature)
It has received criticism from the deaf community for its portrayal of a deaf-mute as silent and separate from those around him, although the main character always appears kind and understanding as he interacts with the people around him, including restaurateur Biff Brannon and young girl Mick Kelly. This novel begins as Spiro Antonapoulos is being sent to a mental institution, and features his best friend, John Singer as the main character. Name this novel by Carson McCullers.
Answer: **The Heart is a Lonely Hunter**

Bonus 7: Math (Algebra)
It takes Alex 4 minutes, Fred 8 minutes, and Jamie 10 minutes to finish a certain homework assignment. Answer the following questions regarding teamwork, giving your answers in minutes as improper fractions.
A: How long would it take Fred and Jamie to finish the assignment by working together?
B: How long would it take Alex and Fred to finish the assignment by working together?
C: How long would it take all three to finish the assignment by working together?
D: How long would it take Alex and Jamie to finish a similar assignment that is half as long as the original assignment?
Answers: A: **40/9 minutes** B: **8/3 minutes** C: **40/19 minutes** D: **10/7 minutes**

Tossup 8: Fine Arts (Music)
Based on a book of the same name written by Gaston Leroux, this musical is a story about a genius named Erik who requests that he have a perpetual salary of twenty thousand francs, and a lifetime reservation of box five in the Opera Garnier *(Gar-nee-ay)*. It is here where he meets Christine, a beautiful soprano that he falls in love with. He gives her voice lessons so that everyone should love her, and much to his chagrin, another man begins courting her. Name this 1986 musical composed by Andrew Lloyd Webber, currently Broadway's longest running and highest-earning musical.
Answer: **The Phantom of the Opera**

Bonus 8: Science (Biology)
Name these terms from biology all beginning with the letter P.
A: The structure that attaches the blade of a leaf to the stem.
B: The scientific study of disease.
C: A three-carbon molecule that is the end product of glycolysis.
D: The organ that secretes insulin, glucagon, and digestive enzymes.
Answers: A: **Petiole** B: **Pathology** C: **Pyruvic Acid** D: **Pancreas**

Tossup 9: Miscellaneous (Sports)
The first game of this year was the first time this team had been shutout since 1991. They won Super Bowl XXXI during the 1996 season, and again went to the game in 1997. Some of their success can be attributed to their home playing field, which is known by football fans as the "Frozen Tundra." Name this NFL team, the archrival of the Chicago Bears, and the only football team in Wisconsin.
Answer: **Green Bay Packers** *(prompt on Green Bay)*

Bonus 9: Social Studies (U.S. History)
Name the Article in the U.S. Constitution in which each of the following phrases can be found.
A: The executive power shall be vested in a President of the United States of America.
B: The Congress, whenever two thirds of both houses shall deem it necessary, shall propose amendments to this Constitution.
C: The ratification of the conventions of nine states, shall be sufficient for the establishment of this Constitution between the states so ratifying the same.
D: All legislative powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.
Answers: A: **2nd** B: **5th** C: **7th** D: **1st**

Tossup 10: Science (Chemistry) -- Computational (30 Seconds)
Phases are not necessary. Give the balanced chemical reaction with integer coefficients and chemical formulas for the complete combustion of butane in air. When a chemical combusts, it combines with oxygen to form an oxide and water vapor. Butane is C4H10.
Answer: **2C4H10 + 13O2 -> 8CO2 + 10H2O** *(arrow read as "yields"; order of chemicals can be changed as long as they are on the correct side of the arrow)*

Bonus 10: Literature (Literature)
Given a T.S. Eliot quote, name the work from which it is taken.
A: “This is the way the world ends: not with a bang but a whimper.”
B: “April is the cruelest month.”
C: “I have heard the mermaids singing, each to each. I do not think that they will sing to me.”
D: “What might have been and what has been point to one end, which is always present.”
Answers: A: **The Hollow Men** B: **The Wasteland** C: **The Love Song of J. Alfred Prufrock** D: **Four Quartets**

HALFTIME

Tossup 11: Fine Arts (Visual Art)
Along with The Charge of the Mamelukes, it was painted by order of the King to inspire the people to stand against Napoleon's forces. The main figure's white shirt and Christlike stance indicate his innocence and role as a martyr. Name this painting by Francisco de Goya.
Answer: **Third of May 1808** *(accept The Execution of the Defenders of Madrid)*

Bonus 11: Math (Other)
Answer the following questions regarding the periodic function y equals negative 2 times the cosine of the quantity 4 x plus 12 pi, close quantity.
A: What is the magnitude of the horizontal phase shift?
B: What is the amplitude?
C: What is the vertical shift?
D: What is the frequency?
Answers: A: **3π** *(do not accept -3π)* B: **2** *(do not accept -2)* C: **0** D: **π/2**

Tossup 12: Miscellaneous (Entertainment)
Born in New York as Leonard, Adolph, Julius Henry, Milton, and Herbert, they first took part in the group The Three Nightingales, which was soon changed to Four, and finally renamed The Six Mascots. Their vaudeville start soon brought them into Hollywood, where they made films like Monkey Business, Duck Soup, and The Story of Mankind. Name these male siblings of comedy inducted in 1977 into the Motion Picture Hall of Fame.
Answer: **The Marx Brothers**

Bonus 12: Social Studies (U.S. History)
Given the name of an estate, name the American president who owned it.
A: Mount Vernon
B: Montpelier
C: Wheatland
D: Ash Lawn
Answers: A: **George Washington** B: **James Madison** C: **James Buchanan** D: **James Monroe**

Tossup 13: Science (Physics) -- Computational (30 Seconds)
To two significant figures, what is the focal length of a converging lens if it produces an image of an object 50 centimeters away, onto a screen 20 centimeters away?
Answer: **14 centimeters**

Bonus 13: Fine Arts (Music)
Given a description of the titular character or object in an opera, name the opera.
A: This opera's title characters are a cripple and a woman he loves in Catfish Row.
B: This opera by Wagner is named after Brunhilde, who is imprisoned in a ring of fire at the end of the opera.
C: This opera by Purcell is named after a Queen of Carthage and the Trojan hero who abandons her.
D: This Gilbert and Sullivan opera is named after a ship initially under the direction of Captain Corcoran.
Answers: A: **Porgy and Bess** B: **Die Walküre** *(accept The Valkyrie)* C: **Dido and Aeneas** D: **HMS Pinafore**

Tossup 14: Social Studies (U.S. History)
It was formed around the ideals of the Wilmot Proviso, and most of their members were Northern abolitionists and anti-slavery Democrats. In 1848, 16 members of Congress were elected from this party, and Martin Van Buren became its first Presidential nominee. Name this political party which fought under a banner of, among other things, free speech and free labor.
Answer: **Free Soil Party**

Bonus 14: Miscellaneous (Technology)
Name these display technologies used in televisions.
A: Best known is this display technology, which applies small currents to crystal molecules to twist them to reflect particular colors of light.
B: Although these displays are much deeper than newer types, they have been used since the 1920s. In these displays, an electron gun is aimed with deflecting coils, and stimulate phosphors on the back of the glass.
C: This is the best technology for displays larger than 50 inches. A mixture of noble gases is ionized by electrodes, and excites phosphors on the back of the display.
D: In this technology, a matrix of tiny mirrors is rotated in front of a color wheel, so that each primary color can be displayed alternately.
Answers: A: **LCD** *(Liquid Crystal Display)* B: **CRT** *(Cathode Ray Tube)* C: **Plasma Display Panel** *(PDP)* D: **DLP** *(Digital Light Processing)*

Tossup 15: Science (Biology)
Originally comprising one taxonomic kingdom, they now make up two of the three domains. Their name means "before nut," which refers to the fact that they don't have a nucleus, or, in fact, any membranous organelles. Name this type of organism colloquially known as bacteria.
Answer: **Prokaryote** *(prompt on bacteria)*

Bonus 15: Literature (Literature)
Given the title of a work, name the play or poem from which it was taken.
A: Of Mice and Men
B: A Raisin in the Sun
C: The Sound and the Fury
D: For Whom the Bell Tolls
Answers: A: **To a Mouse** B: **Harlem** *(or A Dream Deferred)* C: **Macbeth** D: **Devotions Upon Emergent Occasions** *(or Meditation XVII)*

Tossup 16: Math (Algebra) -- Computational (30 Seconds)
A game show features a round of 30 questions. Each question is worth $100 and increases by $200 for each consecutive correct answer. There then follows a bonus round, where the contestant can wager anything up to his or her current score. What is the maximum possible amount that can be won on a single game?
Answer: **180,000 dollars**

Bonus 16: Social Studies (World History)
It was populated mainly by Greeks, and was known to many simply as "The Empire of the Greeks".
A: Identify this term conventionally used to describe the Greek speaking Roman Empire of the Middle Ages.
B: Identify its capital city which since 1930 has been known as Istanbul.
C: Identify the Empire that used the city in part two as its capital from 1453 to 1930.
D: Give the body of water that lies to the south of the city in part two.
Answers: A: **Byzantine Empire** *(also accept Byzantium)* B: **Constantinople** *(do not accept Byzantium)* C: **Ottoman Empire** D: **Sea of Marmara or Sea of Marmora**

Tossup 17: Literature (Mythology)
In one myth, a nymph with a similar name was turned into one to evade being ravished by Priapus. Later, Dryope picked a flower off the tree that nymph had become, and was transformed into one herself. In the Odyssey, eating its fruits made Odysseus' men never want to leave the island they were on. Name this plant whose leaves have the ability to induce forgetfulness.
Answer: **Lotus Tree**

Bonus 17: Math (General)
Given the phrase "If A, then B," state its:
A: Inverse
B: Converse
C: Contrapositive
D: Name the rule of inference that states that the original statement and contrapositive have the same truth value.
Answers: *(order and negation must be correct)* A: **If not A, then not B** B: **If B, then A** C: **If not B, then not A** D: **Transposition**

Tossup 18: Math (General)
The Lucas-Lehmer test can be optimized to check for the existence of these, and it is used by GIMPS, which has found the ten largest known ones, most recently a 9.8-million-digit one in September 2006. The four smallest ones are 3, 7, 31, and 127. Name these primes named after a French mathematician, that have the form 2 to the n, minus 1.
Answer: **Mersenne primes** *(prompt primes, do not accept Mersenne numbers)*

Bonus 18: Science (Physics)
Of alpha, beta negative, beta positive, and gamma, name which one type of radioactive decay each of the following statements refers to.
A: Emits a Helium-4 nucleus from the nucleus.
B: Converts a neutron into a proton.
C: Emits an electron and electron antineutrino from the nucleus.
D: Emits a stream of photons with more energy than x-rays.
Answers: A: **Alpha decay** B: **Beta negative decay** *(prompt beta decay)* C: **Beta negative decay** *(prompt beta decay)* D: **Gamma decay**

Tossup 19: Social Studies (U.S. History)
This man served as governor of New York, becoming a U.S. Senator in 1849. Then, after working towards Lincoln's election, he became the U.S. Secretary of State under Lincoln during the Civil War. He was present at Ford's Theatre on the night of Lincoln's assassination, and was wounded by Booth's accomplice. He recovered and was able to continue his job as Secretary of State under Andrew Jackson. Name this man who, in 1867, made the folly of purchasing Alaska from Russia.
Answer: **William Henry Seward**

Bonus 19: Literature (Literature)
Given a work by an author from Illinois, name the author.
A: Spoon River Anthology
B: McTeague
C: Chicago
D: The Martian Chronicles
Answers: A: **Edgar Lee Masters** B: **Benjamin Franklin Norris** *(Accept Frank Norris)* C: **Carl Sandburg** D: **Ray Bradbury**

Tossup 20: Literature (Literature)
Written in the early thirteenth century, it comprises over a thousand poems and songs divided into six sections. Meaning "Songs of Beuern" in Latin, it is perhaps best known for a choral setting of 24 of the poems. Name this medieval work that Carl Orff set in music, beginning and ending his work with "O Fortuna!"
Answer: **Carmina Burana**

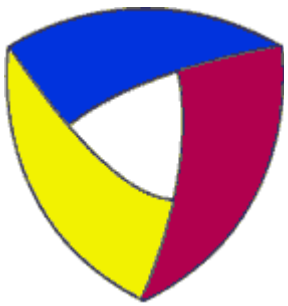
Bonus 20: Science (Chemistry)
Name these elements that do not occur naturally.
A: With atomic number 43, it is by far the lightest element that is not found on Earth.
B: The next lightest synthetic element, it has atomic number 61, a member of the lanthanide series.
C: With atomic number 95, this element is directly after plutonium, and all elements heavier than this one are synthetic. Its name reflects the fact that this element is directly under the element europium.
D: With atomic number 96, it is the next lighest synthetic element, named after a famous husband-wife team of chemists.
Answers: A: **Technetium** B: **Promethium** C: **Americium** D: **Curium**

TIEBREAKERS/REPLACEMENTS:

Tossup: Science (Astronomy)
Johann Daniel Titus predicted that a planet should exist between Mars and Jupiter, so upon its discovery in 1801, it was designated a planet. When further discoveries noted that it was not spherical or large compared to the known planets, William Herschel gave it a new name, meaning star-like. Name this object in our solar system between the fourth and fifth planets, which is now classified as a dwarf planet.
Answer: **Ceres** *(prompt on asteroid before "its discovery")*

Tossup: Literature (Literature)
Because her parents were often busy with social lives, this author spent her childhood playing with small animals she smuggled into the house. Though she likely never brought in badgers or foxes, one of her stories features both, Tommy Brock and Mr. Todd, respectively. Brock kidnaps the children of Benjamin Bunny, who are then sneakily rescued by Peter Rabbit.
Answer: **Beatrix Potter**

Bonus: Science (Biology)
Name these plant hormones.
A: The most common type is indole-acetic acid, and cause stem elongation and various tropisms.
B: This hormone inhibits growth and closes stomata, and gets its name because it was thought to cause leaves to drop off plants.
C: This gas with formula C2H2 is released by fruits causing them to ripen, meaning that a bad apple really can spoil the barrel.
D: This photosensitive pigment detects light and controls biological cycles.
Answers: A: **Auxin** B: **Abscisic acid** C: **Ethylene** *(accept acetylene, NOT ethene)* D: **Phytochrome**



Ægis Questions

11th IHSSBCA Kickoff, 2006
Round 9

Tossup 1: Social Studies (U.S. History)
Born in Braintree, Massachusetts, this man was raised by his wealthy merchant uncle, inheriting the business after his uncle's death. In 1768, he became a revolutionary after his wine shipment on the Liberty was confiscated by the British. Elected to the Massachusetts General Court in 1769, he became president of the Second Continental Congress from 1775 to 1777. Name this man who was the first to sign the Declaration of Independence, and whose name remains a synonym of the word "signature."
Answer: **John Hancock**

Bonus 1: Literature (Literature)
Given a nationality and a work, name the Latin American author.
A: Nicaraguan; Nocturno
B: Mexican; The Labyrinth of Solitude
C: Chilean; The House of Spirits
D: Colombian; Love in the Time of Cholera
Answers: A: **Ruben Dario** B: **Octavio Paz** C: **Isabel Allende** D: **Gabriel Garcia-Marquez** *(Prompt on Marquez)*

Tossup 2: Science (Chemistry)
If the forward reaction produces heat, you need to lower the temperature to favor it. If it produces gas molecules, you need to decrease the pressure to favor it. In general, a chemical system at equilibrium will shift to compensate for a change in pressure, temperature, or concentration. Name this principle of chemistry often used to increase reaction yields, named after a late-19th-century French chemist.
Answer: **Le Châtelier('s) principle**

Bonus 2: Math (General)
Identify the curves defined by the following pairs of parametric equations, where t can be any real number.
A: x equals two t, and y equals t.
B: x equals sine t, and y equals cosine t.
C: x equals hyperbolic cosine of t, and y equals hyperbolic sine of t.
D: x equals t minus sine t, and y equals one minus cosine t.
Answers: A: **Line** B: **Unit circle** *(prompt ellipse)* C: **Unit hyperbola** D: **Cycloid** *(do not accept circle)*

Tossup 3: Miscellaneous (Technology)
In some Japanese encoding schemes, it shares the code "5C" with the yen symbol, leading to many font inconsistencies. In some programming languages, it can be placed at the end of a line to show that the line break should not be there. Other languages use it as an escape character. Also called a slosh or reverse solidus, name this character that separates directory names in DOS, the opposite of the character used in internet addresses.
Answer: **Backslash** *(do not accept slash or forward slash)*

Bonus 3: Social Studies (World History)
Identify the following Romans.
A: This man was the first to make it so that it was not only the wealthy who fought for Rome. This led to armies that were more loyal to their commanders than to Rome itself.
B: This hero of the early republic left his farm to become dictator of Rome. He returned to his farm immediately after his duty was fulfilled.
C: This senator ended almost all of his speeches with the phrase "Carthago delenda est."
D: This man defeated Antony and Cleopatra while commanding Octavian's fleet at the Battle of Actium.
Answers: A: **Gaius Marius** B: **Lucius Quinctius Cincinnatus** C: **Marcus Porcius Cato the Elder or Cato the Censor** *(prompt Cato)* D: **Marcus Vipsanius Agrippa**

Tossup 4: Literature (Literature)
This work loosely derives its subject matter from Arthurian legend, a subject of fascination for its author who would later pen the anthology Idylls of the King. A curse is on the title character, who works all day at her loom in a tower on an island. Her last action is to write her name on the prow of the ship in which she would die. Identify this Alfred, Lord Tennyson poem.
Answer: **The Lady of Shalott**

Bonus 4: Math (Other)
You are rolling two fair six sided dice. Find the probability of rolling the following events. Express your answers as fully reduced fractions.
A: The sum is 12.
B: The product is prime.
C: The sum is odd.
D: The sum is greater than or equal to ten.
Answers: A: **1/36** B: **1/6** C: **1/2** D: **1/6**

Tossup 5: Social Studies (World History)
It was built for king Suryavarman II in the early 12th century and served as his state temple. Dedicated to Vishnu, this temple is designed to represent Mount Meru, the home of the Hindu gods. Despite this, however, in the 14th or 15th century it was converted for use as a Buddhist temple and continues to be used thusly to this day. Identify this UNESCO World Heritage Site that uses the Khmer word for 'temple' in its name, and is located in and featured on the flag of Cambodia.
Answer: **Angkor Wat** *(accept Angkor Vat)*

Bonus 5: Fine Arts (Visual Art)
Answer the following questions about the Mona Lisa.
A: What is its alternate Italian title?
B: What museum now holds the painting?
C: What technique builds the illusion of three-dimensionality by applying layers of thin, translucent glazes that add a haziness to the painting?
D: Da Vinci also used what technique of modeling figures through light and shadow to create an illusion of depth?
Answers: A: **La Gioconda** B: **Louvre** C: **Sfumato** D: **Chiaroscuro**

Tossup 6: Math (Calculus) -- Computational (30 Seconds)
Find the eleventh derivative of the sine of two x. This problem is made easier if you recognize the pattern followed by the derivatives of sine, and that the chain rule is simply repeated on each iteration.
Answer: **-2048 cos(2x)** *(-2048 times the cosine of two x)*

Bonus 6: Social Studies (U.S. History)
Name the described act that led to the American Revolution.
A: This 1764 act put a three cent tax on each gallon of molasses being imported into the colonies from ports outside of Britain.
B: This act required colonists to provide fuel, candles, beer, or shelter to soldiers in need.
C: This harsh act was a response to the Boston Tea Party. It consisted of four laws including the closing of Boston Harbor and the law that forbade Massachusetts colonists from having more than one town meeting a year.
D: This act set up a government for Canada and gave religious freedom to French Catholics.
Answers: A: **Sugar Act** B: **Quartering Act** C: **Intolerable Acts** *(accept Coercive Acts)* D: **Quebec Act**

Tossup 7: Science (Biology)
Pompe's disease, Tay-Sachs, and lipid storage disorders are caused by problems related to these organelles. Internally acidic, their membranes are folded specially to protect themselves from the substances inside them. Name these membranous cell organelles that store digestive enzymes.
Answer: **Lysosome** *(do not accept peroxisomes)*

Bonus 7: Miscellaneous (Entertainment)
Given a famous line, name the movie from which it is taken.
A: “I don’t think any word can explain a man’s life.”
B: “What we’ve got here is a failure to communicate.”
C: “Leave the gun. Take the cannoli.”
D: “Hoke, you’re my best friend.”
Answers: A: **Citizen Kane** B: **Cool Hand Luke** C: **The Godfather** D: **Driving Miss Daisy**

Tossup 8: Fine Arts (Visual Art)
In 1972, the mentally disturbed geologist Laszlo Toth attacked this work with a hammer, prompting a painstaking restoration and subsequent protection of the sculpture behind an unbreakable glass panel in St. Peter’s Basilica. The figure of Mary seems peculiarly young, perhaps to represent her eternal purity. Name this sculpture by Michelangelo, which depicts Mary cradling the crucified body of Christ.
Answer: **Pieta**

Bonus 8: Science (Chemistry)
Give the atomic mass, in atomic mass units, of the heaviest particle remaining after the following nuclear reactions occur.
A: Polonium-210 undergoes alpha decay.
B: Strontium-90 undergoes beta decay.
C: Cobalt-60 emits gamma radiation.
D: Americium-241 emits alpha and gamma radiation at once, turning into neptunium.
Answers: A: **206 amu** B: **90 amu** C: **60 amu** D: **237 amu**

Tossup 9: Math (Algebra) -- Computational (30 Seconds)
Give the sum of the coefficients of the complete expansion of the quantity five x plus two, all raised to the third power.
Answer: **343**

Bonus 9: Literature (Literature)
Name the following characters from Voltaire's Candide, given a brief description.
A: Candide's tutor, who continues to assert that "all is for the best in this best of all possible worlds."
B: Candide's traveling companion, a cynical pessimist.
C: Candide's valet, who as a practical man of action stands in contrast to the philosophers of the story.
D: Candide's lady love, whose blandness casts a satiric light on Candide's passion for her.
Answers: A: **Dr. Pangloss** B: **Martin** C: **Cacambo** D: **Cunegonde**

Tossup 10: Literature (Literature)
In earlier works, he lives in Ilium, New York, but later he resides in Cohoes. His biggest fan is Eliot Rosewater, and according to one book he lived from 1907 to 1981, but a later one said he lived between 1917 and 2001. Name this fictional author created by Kurt Vonnegut who appeared in Timequake and Breakfast of Champions.
Answer: **Kilgore Trout**

Bonus 10: Science (Biology)
Name these types of genetic point mutations.
A: This type of mutation doesn't cause any problem, because it results in a different codon associated with the same amino acid.
B: This type of mutation changes a codon into a different codon and also changes the amino acid expressed.
C: This type of mutation changes a codon into the stop codon, causing protein synthesis to stop at that point.
D: If one base is dropped or added, all the codon triplets are moved over one, causing this type of mutation.
Answers: A: **Silent mutation** B: **Missense mutation** C: **Nonsense mutation** D: **Frame shift mutation**

HALFTIME

Tossup 11: Fine Arts (Music)
Known as “Monsieur Crescendo” because of his writing style, he did not write any opera after the age of 37. His first major success was based on a work by Voltaire, and another of his famous works is the second in a trilogy by Beaumarchais. Name this composer of Tancredi *(tahn-CRAY-dee)* and The Barber of Seville, whose William Tell Overture is commonly heard today.
Answer: **Gioacchino Rossini**

Bonus 11: Math (Calculus)
Evaluate the limits of the following functions, as x approaches zero.
A: The quantity three x squared plus one, over the quantity two x plus three.
B: One over x.
C: One over x squared.
D: Sine of x, all over x.
Answers: A: **1/3** B: **Does not exist** *(accept "undefined"; do not accept 0, infinity, or negative infinity)* C: **Infinity** *(prompt "does not exist" or "undefined")* D: **1**

Tossup 12: Literature (Literature)
Film adaptations changed the original ending, which had the main character leaving to marry Freddy Eynsford-Hill. Its playwright provided a new ending that left the possibility open of marriage between Henry and Eliza. Name this play, written by George Bernard Shaw, which became the basis for My Fair Lady.
Answer: **Pygmalion**

Bonus 12: Science (Chemistry)
Give the total electrical charge, including positive or negative, of each of the following ions.
A: Ammonium
B: Peroxide
C: Oxalate
D: Stannic
Answers: A: **+1** B: **-2** C: **-2** D: **+4**

Tossup 13: Math (Geometry) -- Computational (30 Seconds)
What is the cosine of the angle between the two vectors (3, 4) and (8, 15)? This problem can be solved by constructing right triangles and using the Law of Cosines, though it is more easily solved by recalling that the cosine is equal to the dot product of the two vectors over the product of their two magnitudes.
Answer: **84/85**

Bonus 13: Literature (Mythology)
Much like the New York Yankees, the Greek Army during the Trojan War was stacked. Also like the Yankees, their lineup was gathered by the demolition of neighboring cities. Given the city-state of origin and a brief description, identify the Greek hero.
A: Hailing from Salamis, this mountain of a man nearly defeated Hector with one throw of his spear.
B: King of Ithaca, this hero talked Agamemnon out of retreating.
C: Prince of Phthia *(FITH-ee-uh)*, this moody anti-hero defeated the river Xanthus.
D: Though merely a citizen of Argos, this warrior injured Aphrodite and Aeneas and challenged Apollo and Ares.
Answers: A: **Ajax** B: **Odysseus** C: **Achilles** D: **Diomedes**

Tossup 14: Literature (Literature)
The main character of this novel is actually not the spiritual leader with whom he shares his name, though Buddhism is a major theme in the novel. At one point, he experiences Samsara with the prostitute Kamala, who later dies after getting bitten by a snake. Near the end of the novel, he lives with a riverman named Vasudeva, who teaches him his ways. Name this novel that follows the character's journey toward enlightenment, written by Herman Hesse.
Answer: **Siddhartha**

Bonus 14: Science (Physics) -- Three Parts
In physics, many constants are named after famous scientists, like these three.
A: This constant of quantum mechanics, approximately equal to 6.63 x 10^(-34), is symbolized by a lower-case h.
B: This constant is approximately equal to 6.02 x 10^(23) inverse moles, the number of particles in a mole of substance.
C: This constant, approximately equal to 1.38 x 10^(-23) joules per kelvin, is found by multiplying the ideal gas constant by the constant in part B. It is typically represented with a k.
Answers: A: **Planck('s) constant** B: **Avogadro('s) number** C: **Boltzmann constant**

Tossup 15: Social Studies (U.S. History)
A Republican from Ohio, he emerged as a dark horse to defeat James Cox and become President of the United States. Once described as "an amiable boob," he is widely considered to be one of the worst Presidents. Identify this sixth President to die in office, who advocated a "return to normalcy," and presided over the Teapot Dome scandal.
Answer: **Warren G. Harding**

Bonus 15: Miscellaneous (Technology)
Name these one-syllable terms related to audio management on computers.
A: This verb refers to creating a CD with a CD recording drive.
B: This verb refers to extracting audio from an audio CD, and saving it as MP3 files.
C: This verb refers to adding meta-data to MP3 files, like titles, genres, and albums. This is commonly done in the ID3 format.
D: This patent-free three-letter audio format is a competitor to MP3. Some of its codecs include Speek for voices, Theora for video, and Vorbis for audio.
Answers: A: **Burn** B: **Rip** C: **Tag** D: **Ogg**

Tossup 16: Science (Earth Science)
A longitudinal wave unlike the other type, they can not be observed on the earth's surface between 104 and 140 degrees because they are refracted as they pass between the outer core and mantle. Name this type of wave found in earthquakes, the first one to be observed, that isn't an S-wave.
Answer: **P-wave**

Bonus 16: Social Studies (Other)
Name the inventor of the following devices.
A: Telegraph
B: Sewing Machine
C: Reaper
D: Typewriter
Answers: A: **Samuel Morse** B: **Elias Howe** C: **Cyrus Hall McCormick** D: **Christopher Sholes**

Tossup 17: Miscellaneous (Interdisciplinary)
In mathematics, the theorem of this name relates a closed line integral with a double integral over the region bounded by the corresponding curve. It also appears in the flag of Esperanto, representing hope. The human eye can detect the most shades of this color, with wavelength between 520 and 570 nanometers. Name this color, represented by *(spell out)* 00FF00 in HTML, the color of malachite *(MAL-a-kite)*, viridian, and Ralph Nader's political party.
Answer: **Green** *(accept Green's theorem)*

Bonus 17: Math (Algebra)
You have two binary numbers, one one and zero one. Perform the following operations on them, and give your answer as a two-digit binary number.
A: AND
B: OR
C: XOR *[ex-or]*
D: NAND
Answers: A: **01** B: **11** C: **10** D: **10**

Tossup 18: Social Studies (Geography)
One of the earliest written accounts of this island can be found in the Ramayana. It is to this country that Rama's wife Sita is kidnapped by the demon king Ravana. This country has been rife with civil conflict, with Tamil rebels quarrelling with the government over a desire for an independent state of Tamil Eelam. Identify this country which is the world's leading exporter of tea and cinnamon, which was, until 1972, known by the British as Ceylon.
Answer: **Democratic Socialist Republic of Sri Lanka**

Bonus 18: Literature (Literature)
Identify the author of these literary firsts.
A: The first historical work, The Histories
B: The first novel, The Tale of Genji
C: The first detective story, Murders in the Rue Morgue
D: The first western, The Virginian
Answers: A: **Herodotus** B: **Lady Murasaki Shikibu** C: **Edgar Allan Poe** D: **Owen Wister**

Tossup 19: Science (Physics)
The reference frame of Einstein's theory of special relativity, it is related to relativistic mass, not rest mass. Name this principle described by Newton's First Law of Motion as the tendency of an object to stay at rest or in motion unless acted upon by a force, and which, according to Bill Nye, is a property of matter.
Answer: **Inertia**

Bonus 19: Social Studies (Current Events)
Identify the following about the July 2, 2006 Mexican general election.
A: The Mexican populace was voting for president to replace this man, who has served his full six-year term.
B: This man from the National Action Party was declared president elect on September 5, 2006.
C: This man allegedly lost the presidential election by 0.58% and staged many protests and marches supporting his cause.
D: This man formed a government-in-exile in opposition to Maximilian I, something that the man in number three is considering doing himself.
Answers: A: **Vicente Fox** B: **Felipe Calderón** C: **Andrés Manuel López Obrador** *(prompt on either part)* D: **Benito Pablo Juárez García**

Tossup 20: Math (Other)
First introduced in 1894, it is sometimes called Landau notation. Now mainly used in computer science, it determines complexity classes like EXP time, NP, and P. Name this notation that indicates the asymptotic upper bound of the number of operations required for an algorithm, which once used a capital omicron.
Answer: **Big O notation**

Bonus 20: Fine Arts (Music)
They came not in ones or twos, but in larger numbers. Give the number of pieces in each of the following sets.
A: Mozart's symphonies
B: Beethoven's symphonies
C: Bach's Brandenburg Concertos
D: Elgar's Pomp and Circumstance Marches
Answers: A: **41** B: **9** C: **6** D: **5**

TIEBREAKERS/REPLACEMENTS:

Tossup: Social Studies (U.S. History)
One of this man's many accomplishments includes inventing a glass perfusion pump to make heart surgeries possible. He was also noted for his leadership to keep the United States out of World War II. Soon after he married Anne Morrow, his twenty-month old son Charles was kidnapped by Bruno Hauptmann and found dead just a few miles away from his home. Name this Swedish aviator known as "The Lone Eagle" who is best known for the first solo non-stop flight across the Atlantic in his single-engine aircraft, The Spirit of St. Louis.
Answer: **Charles Augustus Lindbergh Jr.**

Tossup: Math (Algebra) -- Computational (30 Seconds)
Evaluate the cubed root of the quantity four cubed minus thirty-seven, close quantity.
Answer: **3**

Bonus: Literature (Language Arts)
Correctly spell the following words.
A: Pleurisy *(PLUR-ih-see)*
B: Impugn *(im-PYOON)*
C: Discotheque *(DIS-ko-TEK)*
D: Threnody *(THREH-no-dee)*
Answers: A: **PLEURISY** B: **IMPUGN** C: **DISCOTHEQUE** D: **THRENODY**