



1. One character in this opera sings an aria beginning, “Votre toast, je peux vous le rendre” in Lillas Pastia’s tavern. Outside a factory, the title character of this opera sings about how love is a rebellious bird before throwing a flower to her future lover. This opera, which includes a famous *habanera* and Escamillo’s “Toreador Song,” ends after Don Jose desperately stabs the title coquette. For 10 points, name this Georges Bizet opera about a gypsy.

ANSWER: *Carmen*

014-12-70-07101

2. A theorem named after these numbers states that n divided by the natural logarithm of n approximates how many of these numbers are less than n . The Sieve of Eratosthenes can be used to determine if a number is of this type. All integers greater than one can be written as a unique product of this kind of number according to the fundamental theorem of arithmetic. Two is the only even number of this type, which is the opposite of composite. For 10 points, name this type of positive integer whose only factors are itself and one.

ANSWER: prime numbers [or primes]

131-12-70-07102

3. The protagonist of this work can be identified by his springy step when wearing a mask to represent one of the *egwugwu*. After accidentally killing the son of Ezeudu when his gun explodes at Ezeudu’s funeral, the protagonist of this novel is exiled for seven years. Afraid to appear weak like his father, the protagonist deals the killing blow to his foster son Ikemefuna (ih-kay-meh-FOO-nuh), and he hangs himself after failing to instigate a rebellion against the British colonists. For 10 points, name this novel about the Umuofian Okonkwo written by Chinua Achebe.

ANSWER: *Things Fall Apart*

014-12-70-07103

4. The venue for this tournament is named after the winner of the 1973 "Battle of the Sexes" match. In 2011, Serena Williams yelled at the chair umpire during her loss in this tournament's women's singles championship game, and defeated Victoria Azarenka to win in 2012. The winner of the men's singles championship at this event in 2012 was the first British player to win a Grand Slam event since Fred Perry in 1936. For 10 points, name this tennis tournament played at the Billie Jean King National Tennis Center whose 2012 men's singles winner was Andy Murray.

ANSWER: United States Open Tennis Championships [or U.S. Open]

194-12-70-07104

5. Louisa May Alcott used the experience of her father at “Fruitlands” to write a satire on this movement’s “Wild Oats.” Its leaders included Ellery Channing and Margaret Fuller, who edited its chief publication, *The Dial*. One essay grounded in the beliefs of this movement describes a “transparent eyeball” and is titled *Nature*. Another essay from this movement stresses the importance of avoiding conformity. For 10 points, name this American movement propounded by Ralph Waldo Emerson.

ANSWER: transcendentalism [or obvious equivalents]

015-12-70-07105

6. The critical value of this man's namesake dimensionless number represents a transition from conduction to convection. The ultraviolet catastrophe resulted from a law for blackbody radiation he co-named with Jeans breaking down at short wavelengths. One phenomenon named for him has a cross-section proportional to the inverse-fourth power of the wavelength. This man names a method of estimating angular resolution, his namesake criterion. For 10 points, name this English physicist who names a type of scattering which gives the sky its blue color.

ANSWER: John William **Strutt**, 3rd Baron **Rayleigh** [accept either underlined portion]

048-12-70-07106

7. This city was the site of an agreement signed by Neville Chamberlain that ceded the Sudetenland to Germany. The Dachau concentration camp was on this city's outskirts. Adolf Hitler was imprisoned after seizing a beer hall in a failed 1923 putsch in this city. In 1972, members of Black September killed several Israeli athletes after a failed rescue during the Summer Olympics in this city. For 10 points, name this cultural center of the German state of Bavaria.

ANSWER: **Munich** [or **Muenchen**]

015-12-70-07107

8. This quantity is equal to Faraday's constant divided by Avogadro's number. An experiment that measured this value obtained a slightly incorrect result due to using the incorrect viscosity for air. That experiment used a uniform electric field that acted on small droplets of oil and was performed by Harry Fletcher and Robert Millikan. For 10 points, name this constant equal to negative 1.6 times 10 to the negative 19 coulombs (COO-lawms).

ANSWER: **charge of the electron** [or **fundamental** charge; or **e**; or **charge of the proton**]

048-12-70-07108

9. In Islamic tradition, this man bargains with Allah to get the required number of prayers from fifty to five. This son-in-law of Jethro made water flow from a rock by striking it with his staff. He was succeeded as leader of the Israelites by Joshua. This brother of Miriam and Aaron led the Israelites through the wilderness for forty years after parting the Red Sea and bringing down ten plagues on the Egyptians. For 10 points, name this man who saw the Burning Bush and delivered the Israelites from slavery.

ANSWER: **Moses** [or **Musa**]

015-12-70-07109

10. A tone poem by this composer was too radical to be performed during his lifetime and is usually heard in its arrangement by Nikolai Rimsky-Korsakov. That piece by him depicts a witches' sabbath on St. John's Eve. Another of his compositions intersperses a "Promenade" theme with programmatic movements including one depicting Baba Yaga's hut and the grand finale, "The Great Gate of Kiev." For 10 points, name this Russian composer of *Night on Bald Mountain* and the piano suite *Pictures at an Exhibition*.

ANSWER: Modest **Mussorgsky**

014-12-70-07110

11. One character in this play lovingly buys curtains and plans to take a bath in her new house. Another of its characters prefers the Nigerian student Joseph Asagai to the wealthy and arrogant George Murchison. In this play, Willy Harris steals an insurance settlement that Lena wants to use to buy a house and which Walter wants to use to open a liquor store. For 10 points, name this play set in the apartment of the Younger family and written by Lorraine Hansberry.

ANSWER: A ***Raisin in the Sun***

015-12-70-07111

12. This city is named for a Duwamish chieftain who apocryphally gave a speech asking "how can you buy or sell the sky?" Militant anti-globalization protesters forced the World Trade Organization to end its 1999 conference in this city early. Boeing was founded in this city, which is the headquarters for Nordstrom, Amazon, and Starbucks. For 10 points, name this center of the grunge music scene in the 1990s whose Century 21 Expo featured the Space Needle.

ANSWER: **Seattle**

015-12-70-07112

13. One character in this play claims that she had been given leave from her teaching position after the suicide of her husband Allan Grey. During a poker game, one character becomes infuriated at the absence of Mitch and throws a radio out the window. Set in the Elysian Fields of New Orleans, one character in this play says that she has "always depended on the kindness of strangers" after she is raped by Stanley Kowalski, the husband of Stella. For 10 points, name this play about Blanche DuBois by Tennessee Williams.

ANSWER: A **Streetcar Named Desire**

015-12-70-07113

14. This number divided by four is the sum of the sequence beginning one minus one third plus one fifth minus one seventh. The sum of the squares of the reciprocals of the natural numbers is equal to one sixth the square of this number. Archimedes approximated this value by calculating the area of a regular 96-gon. This number is the period of tangent of x and half the period of sine of x. Sometimes approximated as 22/7, for 10 points, name this number, the ratio of a circle's circumference to its diameter.

ANSWER: **pi** [prompt on **3.14159**; prompt on **22/7** before it is read]

131-12-70-07114

15. This man's reign was the subject of a *Secret History* written by Procopius. This husband of Theodora quelled the Nika riots with the help of his generals Narses and Belisarius. This man hired Isidore of Miletus to rebuild the Hagia Sophia. This ruler's most enduring legacy was authored by Tribonian and known as the *Corpus Juris Civilis*. For 10 points, name this great Byzantine Emperor who issued a namesake law code.

ANSWER: **Justinian I** [or Flavius **Justinianus**; or **Petrus Sabbatius**]

015-12-70-07115



1A. What property of a massive object, discussed in Newton's first law, is the tendency of an object to resist changes in its motion?

ANSWER: **inertia**

1B. What Southern city was the location of Fort Moultrie and of Denmark Vesey's failed slave rebellion?

ANSWER: **Charleston**

2A. What Norse god tricked Hodr (HOE-dur) into killing his brother Balder?

ANSWER: **Loki**

2B. What sheep was the first successfully cloned mammal and was named for a country singer?

ANSWER: **Dolly**

3A. What process with "allopatric" and "sympatric" forms allows new organisms to arise from reproductively-isolated populations?

ANSWER: **speciation**

3B. What Polish-born anthropologist analyzed the culture of the Trobriand islanders in his book *Argonauts of the Western Pacific*?

ANSWER: Bronislaw **Malinowski**

4A. What female French philosopher wrote the landmark feminist work *The Second Sex*?

ANSWER: Simone-Ernestine-Lucie-Marie Bertrand de **Beauvoir**

4B. In what state did Governor Scott Walker sign a law that ended collective bargaining rights for public employees?

ANSWER: **Wisconsin**

5A. This is a 20-second calculation question. For a circle of radius 6, what is the area, in terms of pi, of a sector with a central angle of 30 degrees?

ANSWER: **3 pi** square units

5B. This is a 20-second calculation question. How many ways can you arrange 4 people in 3 chairs?

ANSWER: **24** [or **4 factorial**]

6A. John Bonham is the late drummer of what band whose songs include "Houses of the Holy" and "Stairway to Heaven"?

ANSWER: **Led Zeppelin**

6B. This process is the first step in erosion and comes in two types: mechanical and chemical. What is this process that results in the breakdown of rock on the Earth's surface?

ANSWER: **weathering**

7A. This is a 30-second calculation question. Calculate $(\sin(\pi/6) + \cos(\pi/6))^2$ (quantity sin of pi over 6 plus cos of pi over 6, all squared).

ANSWER: **1 plus (the quantity) root 3 over 2** [or **1 plus (the quantity) radical 3 over 2**; or **1.866**]

7B. This is a 30-second calculation question. Describe all asymptotes of the function $f(x) = \frac{(x + 3)(2x + 4)}{2x^2(x + 2)}$ (quantity $x + 3$ times quantity $2x + 4$, all over $2x$ squared times quantity $x + 2$.)

ANSWER: vertical asymptote at $x = 0$, horizontal asymptote at $y = 0$ [or vertical asymptote at the **y axis**, horizontal asymptote at the **x axis**]

8A. What Chilean poet wrote *Canto General* (hen-er-AHL) and *Twenty Love Poems and a Song of Despair*?

ANSWER: Pablo **Neruda** [or Neftali Ricardo **Reyes** Basoalto]

8B. Which Egyptian president was assassinated in 1981 and had earlier signed the Camp David Accords with Israeli prime minister Menachem Begin?

ANSWER: Muhammad Anwar el-**Sadat**

9A. What national park, located mostly in Kentucky's Edmonson County, is named for the world's longest cave system?

ANSWER: **Mammoth Cave** National Park

9B. What day of the week is known as "srehda" in Russian, "Re've'ee," in Hebrew, and "Mercoledi" in Italian?

ANSWER: **Wednesday**

10A. The failure of the POWERGRID corporation's Northern Region Grid in July 2012 led to the world's largest ever blackout in what country?

ANSWER: **India**

10B. Benedict Cumberbatch stars as the title nicotine patch-wearing character on what British television series that also includes Detective Inspector Lestrade?

ANSWER: **Sherlock** [do not accept or prompt on "Sherlock Holmes"]



1. One type of these compounds are defined as having a low Hammett function. Polyprotic kinds of this substance have multiple K_a values. The Ostwald and contact processes produce two common substances of this type. These substances can be defined as electron pair acceptors or proton donors by the Lewis and Bronsted-Lowry definitions, respectively. These substances increase the hydrogen ion concentration in water by the Arrhenius definition. For 10 points, name these substances with pH values below 7, often contrasted with bases.

ANSWER: **acids**

131-12-70-07117

2. The first United Nations peacekeeping mission was sent to this body of water after its northern terminus, Port Said, was seized in 1956. The Bar Lev line on its eastern bank was built after a war in which the Yellow Fleet was trapped in its Great Bitter Lake. The British valued this notably flat waterway developed by Ferdinand de Lesseps as their lifeline to India, since it avoided having to sail around Africa. For 10 points, name this Egyptian waterway connecting the Red and Mediterranean Seas.

ANSWER: **Suez Canal**

153-12-70-07118

3. As a Senator, this man was the only Federalist to vote for the Louisiana Purchase, and he was forced to resign after supporting the Embargo Bill. He served in Congress for 18 years after his presidency. This man argued for the slaves in the *Amistad* Case. He was accused of a "corrupt bargain" when he named Henry Clay Speaker of the House. After one term in the White House, he was defeated in his reelection bid by Andrew Jackson. For 10 points, name this son of the second President.

ANSWER: John **Quincy Adams** [prompt on **Adams**; do not accept or prompt "John Adams"]

015-12-70-07119

4. One character in this film discovers that another character is actually a girl when he wrestles with her on a slope covered in white flowers. In this film, an elder dies after refusing to leave his home, a mill located across a strategically important stream. In the central battle in this film, the attackers possess three muskets, one of which kills Kikuchiyo, who is only a nominal member of a certain class. For 10 points, name this Akira Kurosawa film in which a village of poor farmers is protected by the title group of warriors.

ANSWER: ***Seven Samurai***

014-12-70-07120

5. Senators from this state include the anti-organized crime crusader Estes Kefauver. The eastern area of this state was formed from the remnants of the State of Franklin. Ulysses S. Grant earned the nickname "Unconditional Surrender" after taking Forts Henry and Donnellson in this state. Albert Sidney Johnston died in a battle near this state's Pittsburg Landing that saw many die at the Hornet's Nest. For 10 points, name this state where Civil War battles occurred at Shiloh and Nashville.

ANSWER: **Tennessee**

015-12-70-07121

6. Three similar canvases by this man are titled *Wheat Field with Cypresses*. This man painted *The Yellow House*, his shared residence with Paul Gauguin. He painted a pool table at the center of a room with red walls in *The Night Café*. This artist painted a group of five peasants eating the title food in a dark room in his *The Potato Eaters*. He painted another work from the window of an asylum in Arles. For 10 points, name this Dutch artist of *The Starry Night* who famously cut off his own ear.

ANSWER: Vincent **van Gogh**

015-12-70-07122

7. In one work in this literary genre, Kriemhild has a prophetic dream of a falcon being torn apart by eagles. This genre is characterized by the use of complex extended similes. In the aforementioned example of this genre, bathing in the blood of a dragon renders Siegfried nearly invincible. In addition to the *Nibelungenlied* (nee-buh-LUNG-ehn-leet), another example of this genre opens by invoking the Muse to tell what caused the feud between Agamemnon and Achilles. For 10 points, name this genre of narrative poems, ancient examples of which include the *Iliad*.

ANSWER: **epic** poems [or **epics**]

014-12-70-07123

8. These things are covered by a wall made up of a cellulose "intine" layer and a columella-fortified "exine" layer. They contain vegetative cells, which produce tubes to penetrate the micropyle, and generative cells, which release two sperm cells used in "double fertilization." They are produced in the microsporangium of the anther and are often spread by bees, butterflies, and hummingbirds. For 10 points, name these grains that plants spread to fertilize other plants.

ANSWER: **pollen** grains

080-12-70-07124

9. The protagonist of this work is described as opening his "word-hoard" as he delivers a speech. One opponent of that protagonist bleeds to death after his arm is ripped off. In his final battle, the protagonist of this work is assisted by Wiglaf, who rebukes his fellows for cowardice. The title character of this work is a Geat warrior who defends Hrothgar's mead hall from a monster and the monster's mother. For 10 points, name this Anglo-Saxon epic about a hero who slays Grendel.

ANSWER: **Beowulf**

014-12-70-07125

10. This author wrote about title characters who are seduced by Darryl Van Horne in *The Witches of Eastwick*. He wrote about Sammy quitting his job in a vain effort to defend the honor of three attractive girls in swimsuits in his story "A&P." This author also created the former basketball star Harry Angstrom, who is "at rest," "is rich," and "runs" in a series of novels. For 10 points, name this American novelist of the Rabbit novels.

ANSWER: John **Updike** [or John Hoyer **Updike**]

015-12-70-07126

11. Like glucagon, this hormone's binding to a GPCR results in the creation of cAMP as a "second messenger," stimulating breakdown of glycogen and releasing glucose into the bloodstream. Injected into patients to treat anaphylactic shock, this hormone binds to beta-1 receptors to increase heart rate and works with a neurotransmitter whose name is this hormone's prefixed with "nor." For 10 points, name this hormone that contributes to the fight-or-flight response and is sometimes called adrenaline.

ANSWER: **epinephrine** [or **adrenaline** before it is read]

080-12-70-07127

12. This author described Bill Clinton as “the first black president.” She wrote about Milkman Dead III, who learns he can fly after killing Guitar Baines at the end of *Song of Solomon*. The last American to win the Nobel Prize in literature, this author wrote a novel in which Paul D. and Denver discover that Sethe is haunted by the memory of killing her oldest daughter to spare her from a life of slavery. For 10 points, name this African American novelist of *Beloved*.

ANSWER: Toni **Morrison** [or Chloe Anthony **Wofford**]

015-12-70-07128

13. This scientist built on Godel's (GER-dul) incompleteness theorem to show that the halting problem is undecidable. He co-names a theorem with Alonzo Church which states that a function is algorithmically computable if and only if it is computable on a device named for this man. That device manipulates the symbols on an infinitely long tape. He also devised a test to distinguish between humans and machines. For 10 points, name this English computer scientist who likely died after eating a cyanide-laced apple.

ANSWER: Alan Mathison **Turing**

066-12-70-07129

14. This country had a dispute with a neighboring country over Tuzla Island in the Kerch Strait, which connects the Sea of Azov and the Black Sea. The 2004 Orange Revolution occurred in this country. The Dnieper (NEE-pur) river flows from the north to south in this country, and an autonomous republic within this country lies on the Crimean peninsula. For 10 points, name this country in Eastern Europe which borders Russia and whose city of Pripyat was the site of the 1986 Chernobyl nuclear disaster.

ANSWER: **Ukraine**

194-12-70-07130

15. Studies on one element of this group was used to develop the Lennard-Jones potential. Elements in this group have negative electron affinities and the the highest first ionization energies of any elements. The electron configurations of atoms of these elements appear in a shorthand method for writing electron configurations for all elements. One element in this group is the third most common gas in the Earth's atmosphere. For 10 points, name this group of elements that includes xenon, argon, neon, and helium, so named for their very low reactivity.

ANSWER: **noble gases** [or **inert gases** or **Group 18** elements]

131-12-70-07131



1. An ion of this element is converted to other forms by the SOD enzymes. Hydrogen bonds can form when hydrogen bonds to nitrogen, fluorine, or this element. This element is the most abundant element in the Earth's crust. The triatomic allotrope of this element absorbs ultraviolet rays in the stratosphere; that allotrope is ozone. For 10 points, name this second-most abundant element in Earth's atmosphere behind nitrogen, an element with atomic number 8 and atomic symbol O.

ANSWER: **oxygen**

131-12-70-07132

2. In one section of this work, a boy is murdered and thrown into a pile of manure by the local Jews, whose crime is exposed when his corpse continues to sing "Alma Redemptoris Mater." In another section of this work, a carpenter sleeping in a boat hanging from his ceiling is awoken by the cries for water of the student Nicholas, who is branded on the bottom by the clerk Absolon. For 10 points, name this diverse collection of stories told by pilgrims such as the Prioress and the Miller on the way to the shrine of Thomas Becket, a work of Geoffrey Chaucer.

ANSWER: **The *Canterbury Tales***

014-12-70-07133

3. The density of this quantity for an electromagnetic field is found by crossing the electric and magnetic field's intensities, which yields the Poynting vector. For a sinusoidal wave, this quantity is equal to the amplitude squared. Another form of this quantity can be found to equal current squared times resistance by using Ohm's law on the relation voltage times current. The average form of this quantity is equal to work divided by time. For 10 points, identify this term that denotes the rate at which energy is used, transferred or converted.

ANSWER: **power**

066-12-70-07134

4. This work's third section juxtaposes elaborate descriptions of the hunting and preparation of a deer, a boar, and a fox with the protagonists successive attempts to resist seduction. In retaliation for the protagonist's acceptance of a girdle which supposedly grants invulnerability, Lord Bertilak gives the protagonist a nick on the neck and reveals his true identity. For 10 points, name this Middle English poem in which an Arthurian knight participates in a beheading game with the title figure.

ANSWER: ***Sir Gawain and the Green Knight***

014-12-70-07135

5. The passion of this woman was the subject of a Carl Theodor Dreyer silent film. She claimed to see visions of Saints Michael, Margaret, and Catherine. After playing a role in the Siege of Orleans and meeting the Dauphin Charles VII, she was captured by the Burgundians and sold to the English. This woman was canonized in 1920 despite being burned at the stake for heresy five hundred years earlier. For 10 points, name this female soldier who inspired the French during the Hundred Years' War.

ANSWER: **Joan of Arc** [or **Jeanne d'Arc**]

015-12-70-07136

This is a calculation question. What is the length of the diagonal connecting opposite vertices of a cube with edge lengths of 4?

ANSWER: **4 root 3** [or **4 radical 3**]

What English Baroque composer wrote the semi-opera *The Fairy-Queen* and the opera *Dido and Aeneas*?
ANSWER: Henry **Purcell**