



1. Most meteorites which fall on this extraterrestrial object are classified as shergottites. One geographical feature located on this planet is the Hellas Impact Basin, while the longest serving spacecraft orbiting it is the Odyssey. Other geographical features on this planet include Valles Marineris as well as the tallest mountain in the solar system, Olympus Mons. For 15 points, identify this planet explored by Spirit and Opportunity, the fourth planet from the sun nicknamed the "Red Planet."

ANSWER: Mars

126-13-104-20101

BONUS: What Showtime network TV show follows a Miami serial killer who abides by the Code of Harry?

ANSWER: Dexter

015-13-104-2010-11

2. Organic mechanisms depict the "movement" of these particles with curvy arrows. These particles were discovered in Crookes tubes. "Scanning" and "tunneling" microscopes use these particles. They are described by four quantum numbers. By setting the radius of orbit equal to an integral multiple wavelength, Bohr was able to derive a model where these particles are in fixed orbits. For 15 points, name these negatively charged particles in a "cloud" outside the nucleus.

ANSWER: electrons

190-13-104-20102

BONUS: This is a 20-second calculation question. In triangle ABC, AB is length 5 and BC is length 7. The altitude drawn from angle A also bisects BC. What is the length of side AC?

ANSWER: 5

190-13-104-2010-11

3. It is not an integral, but voltage is equal to this operation between the electric field and the path traveled. Charge enclosed is proportional to this between the electric field and cross sectional area, and magnetic flux is also computed as this operation between field strength and cross-sectional area. Work is equal to this operation between the force and the distance displaced. It is computed by multiplying the magnitude of two vectors times the cosine of the angle between them. For 15 points, identify this vector operation that is contrasted with the cross product.

ANSWER: dot product [or scalar product; prompt on product]

226-13-104-20103

BONUS: This is a 20-second calculation question. Give all the values of x between zero and π , inclusive, where the tangent of quantity x over π radians is undefined.

ANSWER: 1/2, 3/2, and 5/2 [do not accept or prompt on fewer or more answers]

003-13-104-2010-11

4. This politician supported Barry Goldwater's presidential campaign with the "A Time for Choosing" speech. Members of this man's administration violated the Boland Amendment. This President was reelected by receiving every electoral vote except for Minnesota's and D.C.'s against Walter Mondale. This man's Secretary of Defense Caspar Weinberger resigned because of the Iran-Contra scandal. For 15 points, name this President who asked Mikhail Gorbachev to "tear down this wall" in 1987.

ANSWER: Ronald Wilson Reagan

023-13-104-20104

BONUS: The terrorist group Al-Shabab (shuh-BOB) killed over sixty people in a 2013 attack on the Westgate Mall in what African country?

ANSWER: **Kenya**

015-13-104-2010-11

5. The star NP0532 is found within this object. This object, observed by John Bevis in 1731, was later observed by a man who believed it to be Halley's Comet before he realized it did not move. The formation of this body was observed in 1054 by Chinese astronomers, who witnessed the supernova that created it. For 15 points, name this nebula in the constellation Taurus, the first object in the Messier catalogue.

ANSWER: **Crab** nebula [or **M1**; or **Taurus A**; or **NGC 1952**]

140-13-104-20105

BONUS: This is a 30-second calculation question. Find all values of x such that the absolute value of x equals the absolute value of the quantity $2x$ minus 5.

ANSWER: **5** and **5/3** [or **5** and **1 2/3**]

233-13-104-2010-11

6. During the Civil War, this town switched between Union and Confederate control eight times. The free black man Heyward Shepherd was the first person killed in an event in this town. That event in this town was put down after an engine house was stormed by Marines under Robert E. Lee. This town was attacked in 1859 by twenty-one men trying to take its federal arsenal. For 15 points, name this town, now in West Virginia, that was the subject of a raid led by John Brown.

ANSWER: **Harpers Ferry**

023-13-104-20106

BONUS: This is a calculation question. On a three-question multiple choice test, where there are four answer choices for each question, you guess randomly. What's the probability that you get exactly two of them right?

ANSWER: **9/64**

190-13-104-2010-11

7. One proof considers whether this number raised to its own power is rational, and if not, raises it to itself again to produce a number which is definitely rational. If this number could be written as a fraction, both its numerator and denominator would have to be even. The sine of 45 degrees is equal to this number's reciprocal. For 15 points, identify this irrational number equal to approximately 1.414, whose square is an even prime number.

ANSWER: the square **root** of **2**

233-13-104-20107

BONUS: This is a 20-second calculation question. What number is in the top-left corner of the inverse of the matrix whose first row is [4 5] and whose second row is [2 3]?

ANSWER: **1.5** [or **3/2**; or **1 1/2**]

190-13-104-2010-11

8. This country's northernmost point is a cape named after the philanthropist Morris Jesup. The capital of this country was originally known as "Godt-Haab." It is home to the world's largest national park, and its northern peninsula is named "Peary Land" after the explorer Robert Peary. This island's name was supposedly given by Erik the Red as a way to attract settlers. For 15 points, name this largest island in the world, which despite greater autonomy, is still controlled by Denmark.

ANSWER: **Greenland** [or **Kalaallit Nunaat**]

052-13-104-20108

BONUS: This is a calculation question. You roll two N-sided dice, with faces numbered one through N. What is the smallest value of N for which the expected value of the dice's sum is greater than 6?

ANSWER: 6

190-13-104-2010-11

9. Behind Samsung and Intel, this company is the third largest manufacturer of semiconductors in the world. Patrick Haggerty was integral to this company's success as he brought onboard Gordon Teal and Willis Adcock. Their development of the 7400 series of TTL chips resulted in the popularity of integrated circuits being used for computer logic. For 15 points, name this company famous for its graphing calculator series that include the 83 and 83-Plus.

ANSWER: Texas Instruments

147-13-104-20109

BONUS: This is a 30-second calculation question. A circle has radius 10 inches. A sector of the circle has area 25π square inches. In degrees, what is the measure of the central angle subtended by this sector?

ANSWER: 90 degrees

190-13-104-2010-11

10. Some verbs add a "g" in this tense, and others change a "c" to a "zc" when in the first person singular in this tense. The stem-changing verbs are defined as those whose stem vowel changes when it is stressed in this tense and not in other tenses. The only verb which takes the same form for all persons and numbers in this tense is "hay" ("EYE). -Ar ("A"- "R") verbs in the indicative of this tense take the endings o, -as, -a, -amos,

ANSWER: Spanish present tense

019-13-104-20110

BONUS: This is a 20-second calculation question. Consider the equation y equals tangent of x minus quantity π over 4. At what angle between 0 and π radians would the graph of this equation have a vertical asymptote?

ANSWER: 3π over 4 radians [or $3/4\pi$ radians; or 0.75 π radians; or 135 degrees]

190-13-104-2010-11

11. Certain words in this language that receive syllable stress on the penultimate vowel are called segolates. The system of assigning numerical value to a word in this language is called gematria, and plurals are typically created by appending an "eem" or "oht" suffix depending on the gender. This language was revived by Eliezer Ben-Yehuda, who added words to modernize it from its original Biblical version. For 15 points, name this language that along with Arabic is an official language of Israel.

ANSWER: Hebrew

081-13-104-20111

BONUS: This is a 30-second calculation question. The two roots of a second degree polynomial P are i and negative i . If the y -intercept of the graph of P of x is 2, what is the polynomial in standard form?

ANSWER: $2x^2 + 2$

190-13-104-2010-11

12. Pronouns of this type are the "V-form," which is distinguished from "T-form" pronouns. In French, this type of pronoun and the T-form are identical for plural, but the singular versions are different. In German, this pronoun is the same as the third person, "Sie," which is also true for Mexican Spanish, which uses "usted" instead of the less polite "tú." For 15 points, name this type of pronoun used when talking to strangers or social superiors.

ANSWER: formal second person

121-13-104-20112

In February 2010, this man declared his state was in fiscal emergency and on the same day eliminated the Department of the Public Advocate. On election day 2013, this man won re-election over Democratic challenger Barbara Buono. In 2012, he drew criticism from his own party after visiting areas affected by Hurricane Sandy with Barack Obama. In January 2014, he was accused of conspiring to create traffic jams on the George Washington Bridge as retribution against Fort Lee Mayor Mark Sokolich. For 15 points, name this current governor of New Jersey.

ANSWER: Chris **Christie**

225-13-104-2010-11

13. The Euler-Mascheroni constant measures the difference between this function of n and the n th partial sum of the harmonic series. When this function is extended to complex numbers, this function of i returns i times π over two. The Taylor series of this function of x plus one begins x minus x -squared over two plus x -cubed over three. This function is the anti-derivative of the function one-over- x . For 15 points, identify this function, the inverse of the exponential function, denoted "LN".

ANSWER: **natural logarithm**

233-13-104-20113

BONUS: This is a 30-second calculation question. A normally distributed sample has a mean of 35 and a standard deviation of 6. Using the empirical rule, 95% of the data should lie between which two numbers?

ANSWER: **23** and **47**

190-13-104-2010-11

14. Test subjects resembling these animals are the result of Soviet geneticist Dmitry Belyaev's ongoing breeding experiments. Because these animals possess a ligament connecting their chest vertebrae to the back of the second cervical bone, they expend less energy when running long distances. Because these animals can taste sweetness, they are incredibly susceptible and vulnerable to theobromine poisoning from eating chocolate. These animals regulate their body temperature by panting. For 15 points, name these animals, the domesticated relatives of foxes and wolves.

ANSWER: **dogs** [or **Canis lupis familiaris**; or any word form involving **canines**]

020-13-104-20114

BONUS: This is a 20-second calculation question. The side lengths of an isosceles trapezoid are x , $2x$, $3x$, and 6. What is the largest possible perimeter of the trapezoid?

ANSWER: **42**

190-13-104-2010-11

15. This phylum includes anthozoans and hydrozoans, such as the *Hydra* genus. Organisms in this phylum have mesoglea between their endoderm and ectoderm and lack a mesoderm. The life cycle of organisms in this phylum commonly includes both a polyp and medusa stage. Members of this phylum can project nematocysts in self-defense, which can be deactivated with vinegar and are alternately called stinging cells. For 15 points, identify this phylum of jellyfish.

ANSWER: **Cnidaria** (NIGH-dare-EE-uh)

066-13-104-20115

BONUS: What bank agreed to a \$5.1 billion settlement with the Federal Housing Finance Agency for misleading Fannie Mae and Freddie Mac about mortgage-backed securities it sold them?

ANSWER: **J.P. Morgan** Chase and Company

121-13-104-2010-11

16. This author wrote a play in which Stephan asks his estranged father, a wealthy arms manufacturer, for money. That arms manufacturer then promises to donate to the Salvation Army, angering his devote daughter. This author is perhaps best known for a play where Henry Higgins wagers that he can pass the cockney Eliza Doolittle for an upper-class woman. For 15 points, name this author of *Major Barbara* and *Pygmalion*.

ANSWER: George Bernard **Shaw**

230-13-104-20116

BONUS: This is a 30-second calculation question. A heat in a swimming meet has 9 racers. If the top 3 swimmers in the heat qualify for the finals, how many different possible groups of finalists from this heat are there?

ANSWER: **84**

037-13-104-2010-11

17. The protagonist of one of this man's novels leaves home with Lacey Rawlins after the death of his grandfather. That novel, succeeded by *The Crossing* and *Cities of the Plain*, follows John Grady Cole. In his most acclaimed novel, Judge Holden outlives all of the other members of a band of scalp-hunters, including "the kid." For 15 points, name this contemporary novelist of *No Country for Old Men*, *All the Pretty Horses*, and *Blood Meridian*.

ANSWER: Cormac **McCarthy**

014-13-104-20117

BONUS: This is a 20-second calculation question. What is y in the solution to the system of equations: " $y = x + 3$ ", and " $x + 2y = 9$ "?

ANSWER: **4**

190-13-104-2010-11

18. This man showed the limitations of rationalism with self-evident contradictions he called "antinomies." He claimed rationalists and empiricists were unable to account for synthetic and "a priori" truths, whose existence he defended with transcendental arguments. In the *Groundwork of the Metaphysics of Morals*, he said that all moral actions should be such that we could will them to be universal laws, his categorical imperative. For 15 points, name this author of *Critique of Pure Reason*, a German transcendentalist philosopher.

ANSWER: Immanuel **Kant**

121-13-104-20118

BONUS: This is a 20-second calculation question. How many angles between 0 and 10 pi radians have a reference angle of pi over 4?

ANSWER: **20**

190-13-104-2010-11

19. One of his novels begins with a plane exploding over the English channel, though Gibreel Farishta and Saladin Chamcha are miraculously saved. This novelist wrote about the long-nosed Saleem Sinai, who was born at the moment of India's independence from Britain, in his novel *Midnight's Children*. For 15 points, name this Indian-British novelist whose book *The Satanic Verses* resulted in Ayatollah Khomeini calling for his death.

ANSWER: Salman **Rushdie**

014-13-104-20119

BONUS: This is a 30-second calculation question. A 120 degree angle in a triangle is formed by two sides measuring 5 feet and 10 feet. In simplest radical form, what is the length, in feet, of the third side?

ANSWER: **5** times the square **root** of **7** [or **5 root 7**]

190-13-104-2010-11

20. In the body, a compound that promotes smooth muscle relaxation is really this element's monoxide, a common free radical. In covalent molecules, this element usually forms a trigonal pyramidal geometry and has one lone pair. Most neutral weak bases contain this element. The only common homonuclear diatomic molecule with a triple bond consists of this element. For 15 points, name this element which bonds hydrogen in ammonia and has atomic number 7.

ANSWER: **nitrogen**

190-13-104-20120

BONUS: This is a 30-second calculation question. A dartboard with radius 10 inches has an inner bullseye of radius 5 inches. A dart on the bullseye is worth 100 points and a dart on the outer circle is worth 20 points. What is the expected value of a single dart that hits the dartboard?

ANSWER: **40** points

190-13-104-2010-11

21. A seventy-four-minute Wilhelm Furtwangler recording of this symphony is sometimes cited as the specific reason why CDs have a seventy-four-minute playing time. Leonard Bernstein conducted a version of it at the Brandenburg Gate to celebrate the fall of the Berlin Wall. This symphony ends with lyrics referencing a "beautiful spark of divinity" and "daughter from Elysium," performed by vocalists singing words taken from Friedrich Schiller's poem "Ode to Joy." For 15 points, name this final complete symphony of Ludwig van Beethoven.

ANSWER: **Choral** symphony [or **Beethoven's Ninth** Symphony; Beethoven is not needed after being mentioned; do not accept or prompt on "Ode to Joy"]

052-13-104-20121

This man founded the all-female music group called the Moranbong Band. He is the dedicatee of the song "Onwards Toward the Final Victory." This man has attempted to erase the past of his wife, a former singer in the Unhasu Orchestra, and his former bodyguard revealed the existence of more than a dozen of this man's private homes, including Ryongsong Residence. This world leader notoriously purged his own uncle, Jang Sung-taek, and the first American he ever met may have been Dennis Rodman. For 15 points, name this Supreme Leader of North Korea.

ANSWER: **Kim Jong-un** [prompt on **Kim**]

052-13-104-2010-11

22. At the end of this poem, the speaker says "he prayeth best, who loveth best all things both great and small." In this poem, the title character laments "water, water, everywhere, nor any drop to drink" and sees his cohorts killed after Death wins their souls in a dice game. The title character tells his story to a wedding guest, which begins after he is cursed for shooting an albatross. For 15 points, name this Samuel Taylor Coleridge poem about the fate suffered by an old sailor.

ANSWER: "The **Rime of the Ancient Mariner**"

052-13-104-20122

BONUS: This is a 30-second calculation question. If $f(x)$ ["f of x"] equals $4x+3$ and $g(x)$ equals $2x^2 - 5$, find f composed with g ; that is, find f of g of x .

ANSWER: **$8x^2 - 17$**

037-13-104-2010-11

23. This author used the example of a waiter who acts too waiter-like to illustrate the concept of "bad faith" in his essay *Being and Nothingness*. This lover of Simone de Beauvoir wrote a notable play which takes place in a Second Empire drawing room and centers upon Garcin, Estelle, and Inez's relationship. For 15 points, identify this French existentialist who wrote that "Hell is other people" in his play *No Exit*.

ANSWER: Jean-Paul **Sartre**

126-13-104-20123

BONUS: This is a 20-second calculation question. Find the exact solution of the equation $7 + 5e^x = 10$.
["seven plus five times e to the x equals ten"]

ANSWER: **ln 0.6** [or **ln 3/5** or **ln 3-ln 5**; or the **natural log of 3/5**; or the **natural log of 0.6**; or the **natural logarithm of 3/5**; or the **natural logarithm of 0.6**]

037-13-104-2010-11

24. The narrator of one of this man's novels was born on the night that the Wilhelm Gusloff sank and discovers that his son is a hero to neo-nazis for shooting Wolfgang Stremplin. Another novel by this man follows Mahlke as he salvages items from a minesweeper. In addition to *Crabwalk* and *Cat and Mouse*, this man wrote about Oskar Matzerath, whose cry can be used as a weapon in another work. For 10 points name this author of *The Tin Drum*, which is part of his *Danzig Trilogy*.

ANSWER: Gunter **Grass**

123-13-104-20124

BONUS: This is a calculation question. On Monday, there's a 10% chance of rain, which increases to 20% on Tuesday and 30% on Wednesday. What's the probability it rains all three days?

ANSWER: **3/500** [or **6/1000**; or **0.006**; or **0.6%**]

190-13-104-2010-11

25. Calcium deposits are found in these structures in a disease named for Monckeberg. Foam cells, or macrophages that have taken up oxidized-LDL, often adhere to the walls of these structures. The brachiocephalic and left subclavian ones "arch" off the largest of these structures, which has an ascending and a descending part. The wall of these valveless structures thickens and hardens when triglycerides and cholesterol accumulates. The pulmonary one carries deoxygenated blood to the lungs, while all others carry oxygenated blood to the body. For 15 points, name these blood vessels, the counterpart to veins.

ANSWER: **arteries** [or **artery**]

020-13-104-20125

BONUS: What man replaced Timothy Geithner as Barack Obama's Secretary of the Treasury?

ANSWER: Jacob "Jack" **Lew**

052-13-104-2010-11

26. This location is home to the Very Large Telescope. Animals that survive here include Darwin's leaf-eared mouse and some Humboldt Penguins. This desert has a region south of Antofagasta which resembles Martian soil. It was once home to the world's largest supply of sodium nitrate, but now features numerous abandoned "saltpeter" mining towns. This desert typically gets about fifteen millimeters of rain a year. For 15 points, name this South American desert, the driest in the world.

ANSWER: **Atacama** Desert [prompt on **Chile**]

052-13-104-20126

BONUS: This is a 30-second calculation question. An ant, standing 35 feet away from a tree trunk, looks up at an angle of 60 degrees and can just see the treetop. How far away is the ant from the top of the tree?

ANSWER: **70** feet

190-13-104-2010-11



27. A function F taking in this type of data as inputs equals x times F plus x prime times F prime, according to Shannon's expansion theorem. An expression outputting this type of data appears in the first line of a while loop. Conjunction and disjunction are operations applied to this type of data, which Ludwig Wittgenstein first manipulated in "tables". For 15 points, name this type of data which can only take on two values, true and false, named for a British logician.

ANSWER: **Boolean** data [or **logical** data; or **true and false** before mention; prompt on "truths"]

190-13-104-20127

00--20-2010-11