

Blue Devil Academic Tournament II

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Round 3- Tossups

**1. The protagonist of this story writes down the number “55890” before recalling a memory from her youth. Another character in this work wears a shirt with blue parrots and observes a monkey on a chinaberry tree when they stop for food at “The Tower.” In this short story, another character reminisces about how her friend would inscribe a (\*) watermelon with the initials “E.A.T.” At the end of this story, the antagonist discusses Jesus with the grandmother before shooting her. For ten points, name this story in which the “Misfit” kills off a family headed to Florida, written by Flannery O’Connor.**

ANSWER: “A Good Man is Hard to Find”

**2. During one event in this country, Waleed Rashed organized the April 6 Youth Movement to support participants of a certain cause. Anger over the destruction of a church led to the Maspero demonstrations in this nation. In this country, the Freedom and Justice Party’s candidate was selected by the (\*) Muslim Brotherhood to replace a man who won five straight presidential victories, causing major protests at Tahrir Square. For ten points, name this African nation led by Mohammad Morsi which in 2011 was the site of protests against Hosni Mubarak.**

ANSWER: Arab Republic of Egypt

**3. In Act II of this opera, an offstage trumpet call signals the Prime Minister’s approach. In Act I, one character rejects the advances of her father’s assistant, Jacquino, before singing the aria “Oh, were we only married now.” Later in that act, the (\*) *Prisoners’ Chorus* is sung before the arrival of Governor Pizarro, who, in the finale, nearly stabs the political prisoner Florestan before the title character draws a concealed pistol upon him. For ten points, name this opera in which that seemingly male character reveals herself to be the prisoner’s wife, Leonora, the only opera by Ludwig Beethoven.**

ANSWER: Fidelio

**4. The change in this quantity equals 10.5 times the gas constant for the boiling of various liquids according to Trouton’s Rule. At equilibrium, the change in this quantity is equal to the change in enthalpy over the temperature. For a chemical reaction, the sign of it can be predicted by measuring the moles of (\*) gas on both sides of the equation. A crystal at zero Kelvin has a value of 0 for this property, which, according to the Second Law of Thermodynamics, increases in the universe for every spontaneous process. For ten points, name this measurement of a system’s disorder symbolized S.**

ANSWER: entropy (or S before mention)

**5. One of this man’s prized possessions constructed with oxhide thongs was based around the frame of an olive tree, and was his bed. This figure’s victory over a son of Telamon in a speech contest for the armor of Achilles prompted Ajax to commit suicide. One story involving this figure tells of him succeeding in a challenge to shoot an (\*) arrow through twelve axeheads. In one adventure, he said that he was “No man” after running a stake through the eye of Polyphemus. For ten points, name this man from Ithaca, the father of Telemachus and husband of Penelope, who is the subject of an epic by Homer.**

ANSWER: Odysseus (or Ulysses)

**6. The Habesha people were an ethnic group that lived in this modern-day nation, whose capital was changed to Adefa during the Zagwe dynasty. One empire with this name lost at Shimbira Kure to the Kingdom of Adal, and this nation at one time was led by Mengistu and a military junta named the Derg. One king of this modern-day nation signed the Treaty of Wuchale. At the Battle of (\*) Adowa, this country won its independence against Italian forces under Menelik II. For ten points, name this African nation once ruled by Haile Selassie until he was removed during an invasion of Addis Ababa.**

ANSWER: Ethiopia

**7. One of this architect's commissions includes a floor called the "Great Court." He drew on Muslim architecture to design a building located on an island off the coast of Qatar. This architect of Dallas City Hall incorporated a glass pavilion in a building in Boston shaped like an upright trapezoid. This designer of the (\*) John F. Kennedy Presidential Library included a cylindrically shaped performance hall in a building located near Lake Erie in Cleveland. For ten points, name this architect of the Rock and Roll Hall of Fame and the glass pyramid at the Louvre, known for being Chinese-American.**

ANSWER: Ieoh Ming Pei

**8. According to one account, a leader of this civilization jumped into a fire after being routed by Geron at Himera. This civilization won the Mercenary War, and another of its leaders established the Magonid dynasty and won the Battle of Alalia. A more notable general of this civilization won the Battles of the (\*) Trebia and Cannae before finally being defeated by Scipio Africanus at the Battle of Zama, ending his attempts to use elephants to cross the Alps. For ten points, name this enemy of Rome during the Punic Wars, home to the general Hannibal.**

ANSWER: Carthage

**9. The solutions to an equation named for this man can be found with the Hartree-Fock method. In its time-dependent form, that equation replaces the eigenvalue  $E$  with  $i\hbar$  times the time partial derivative of the wavefunction. This scientist criticized the Copenhagen interpretation by discussing the collapse of many possible quantum states into a single state. In a (\*) letter addressed to Albert Einstein, this physicist discussed a Geiger counter and a vial of hydrocyanic acid sealed in a box with an animal which might be alive or dead. For ten points, name this Austrian physicist who had a namesake thought experiment involving a cat.**

ANSWER: Erwin Schrodinger (accept Schrodinger equation or Schrodinger's cat)

**10. The different movements of one of this composer's symphonic poems depicts the title character's youth, sister, death, war, and lament. This composer's Opus 47 is scored in D-major and is his only violin concerto. The most famous work by this composer of *Kullervo* contains a hymn written by Wainio Sola and was released as "Impromptu" to evade (\*) Russian authorities. This composer of the *Lemminkäinen Suite* utilized stories from his country's national epic, the *Kalevala*. For ten points, name this nationalistic composer of *Finlandia*.**

ANSWER: Jean Sibelius

HALFTIME. SCORECHECK. ASK IF THERE ARE ANY PLAYER SUBSTITUTIONS.

**11. The Oresund indirectly connects this sea to an ocean, and the Aland Islands lie at the southern end of its northern branch in the Archipelago Sea. It is connected to the Kattegat by the Great and Little Belts, while the Oder River flows into the Bay of Pomerania at its southern end. The city of (\*) Gdynia also lies in the south, while the eastern exclave of Kaliningrad provides one country with access to it. This body is connected to another body of water to its west by the Kiel Canal. For ten points, name this body of water on which Riga and Stockholm lie, a sea with arms known as the Gulfs of Bothnia and Finland.**

ANSWER: Baltic Sea

**12. This character is shown a silver cigarette case inscribed with a quote by Elizabeth Browning and later hears a Mexican woman announce that she is selling “flowers for the dead.” This character leaves Belle Reve to escape the haunting memory of her husband’s suicide. This figure is prone to taking long baths and hangs (\*) Chinese lanterns around her sister’s apartment. She also begins a relationship with Mitch before being raped by her brother-in-law Stanley. For ten points, name this sister of Stella Kowalski who is the protagonist of Tennessee Williams’ *A Streetcar Named Desire*.**

ANSWER: Blanche DuBois (accept either name)

**13. This country is home to the majority of a people who represent the conflict between good and evil with “deer dancers.” This nation, home to most of the Yaqui, is the subject of Edward Tylor’s *Anahuac*. One civilization based here has gained skepticism about its origins due to unusual (\*) basalt sculptures. This country contains a city with statues of reclining figures called Chac-Mools and a giant temple shaped like a step pyramid nicknamed “the castle.” For ten points, name this country home to large stone heads and Chichen Itza, left by the Olmecs and Mayans.**

ANSWER: Mexico (or United Mexican States; or Estados Unidos Mexicanos)

**14. One character in this play compares herself to a “shipwrecked woman clinging to a spar,” and that character later admits to not believe in miracles anymore. Before that, the protagonist of this play eats some macaroons and causes one character to grow angry after she dances the (\*) tarantella in front of Dr. Rank. After the central character, a “little skylark,” is discovered to have forged a signature, she slams the door in front of Torvald. For ten points, name this play about Nora Helmer written by Henrik Ibsen.**

ANSWER: A Doll’s House (or *A Doll House* or *Et dukkehjem*)

**15. As President of the Board of Trade, this politician gave the government power to oversee a private company with the Railway Regulation Act. This man abolished a paper tax on newspapers while serving as Chancellor of the Exchequer under Lord Palmerston. After the April Uprising in the Ottoman Empire, this politician began his (\*) Midlothian Campaign. As Prime Minister, this man introduced a failed bill that would have formed a separate Parliament for Irish Home Rule. For ten points, name this Liberal British Prime Minister in the 1890s famous for his rivalry with Jewish politician Benjamin Disraeli.**

ANSWER: William Ewart Gladstone

**16. One member of this movement disagreed with the Calvinist idea of the “elect” in an essay discussing that a certain trait “is not an organ” or “function” or “faculty.” Another member of this movement labeled Daniel Webster as prudent in an essay asserting “that (\*) government is best which governs least.” This movement was led by the author of “The Oversoul” and introduced the “foolish consistency” of the “hobgoblins of little minds.” Another of its members detailed how he built his house at Walden Pond to become self-reliant. For ten points, name this movement led by Henry David Thoreau and Ralph Waldo Emerson.**

ANSWER: Transcendentalism (accept word forms)

**17. This value equals twice the elementary charge divided by the Josephson constant. The energy of a wave times its wavelength divided by the speed of light yields this value. The uncertainty principle states that the product of two uncertainties must be greater than it divided by four pi. Angular momentum is quantized in units of this quantity measured in Joule-seconds. A (\*) reduced form of it is divided by two-pi and is represented with a bar on it. It is the proportionality constant between a photon’s frequency and its energy. For ten points, name this constant equal to about 6.63 times 10 to the negative 34th, symbolized h and named for a German physicist.**

ANSWER: Planck’s constant (or h, accept reduced Planck’s constant, h-bar, or Dirac’s constant before “bar”)

**18. During this campaign, anger over the retreat of a group of German soldiers led them to be infamously called the “Flying Dutchmen.” Plans to cut off a railroad supply during this campaign were stopped after the failure of Stoneman’s Raid. Jeb Stuart briefly led the Confederates during this engagement, part of which was fought in the (\*) Wilderness. This campaign’s turning point came with the defeat of the Sixth Corps at the Second Battle of Fredericksburg, prompting the inept Union General Joseph Hooker to end his assault. For ten points, name this 1863 victory for Robert E. Lee that resulted in friendly fire killing Stonewall Jackson.**

ANSWER: Chancellorsville Campaign (accept “Battle of Chancellorsville”)

**19. During this process, a double-bond is formed in a substrate because of the extraction of water by enolase, leading to the formation of PEP. In the first step of this process, an enzyme named hexokinase transfers sugar to a different molecule. A net gain of 2 (\*) NADH occurs in the energy payoff phase of this pathway. This process includes the activation of phosphofructokinase [pr. Fos-foe-frook-toe-ki-nase], and yields two ATP molecules as well as two molecules of pyruvate. For ten points, name this pathway that breaks down glucose outside of the mitochondria and precedes the Krebs cycle.**

ANSWER: Glycolysis (prompt on “Cellular Respiration”)

**20. The speaker of one of this poet’s works states “Love is not love, but given free” and argues with Lord Henry Wotton. Another of his poems asks “Hast thou since/Purpled thy nail in blood of innocence.” He also told of “virtuous men” who “pass mildly away” and “whisper to their souls to go” in another poem. This author describes a creature that “(\*) suck’d me first, and now suck’d thee” and describes another subject as “mighty and dreadful,” concluding “thou shalt die.” For ten points, name this English Metaphysical poet of “A Valediction: Forbidding Mourning,” “The Flea,” “Death be not Proud,” and *Holy Sonnets*.**

ANSWER: John Donne

YOU HAVE REACHED THE END OF THE ROUND. DO NOT GO ON TO TOSSUP 21 UNLESS THERE IS A TIE.

**21. The speaker of this work declares that now is not the time to “engage in the luxury of cooling off” or “take the tranquilizing drug of gradualism.” The speaker of this work compares a certain action to cashing a check in the “bank of justice.” In this speech, the author will not be happy until “(\*) justice rolls down like waters, and righteousness like a mighty stream.” The speaker desires a world in which his four children will be judged not by “the color of their skin but by the content of their character.” For 10 points, name this August 1963 speech delivered at the Lincoln Memorial by Martin Luther King, Jr.**

ANSWER: “I Have a Dream”

### Round 3- Bonuses

1. One of these creatures receives jewels from Empress Jingō in hopes of her defeating the Korean army. For ten points each:

[10] Name these creatures exemplified by the form taken by the Shinto god Ryūjin. They are usually depicted as large fire-breathing serpents that can fly.

ANSWER: **dragons**

[10] In Shinto myth, *Ryūjin* is the god of this domain. In Greek mythology, it is ruled by a god who lost a contest to Athena after she created an olive tree.

ANSWER: the **sea** (or **ocean**; prompt on “water”)

[10] The *kami* Susano’o, the brother of Amaterasu, is a figure who defeated this eight-headed dragon by using a powerful sword named Kusanagi.

ANSWER: Yamata no **Orochi**

2. For ten points each, name these Asian mountain ranges.

[10] The Indus, Ganges and Brahmaputra are major rivers that rise in this range. It contains over 100 mountains that exceed 7,200 meters in height, including the world’s tallest, Mount Everest.

ANSWER: **Himalayas**

[10] This range lies northwest of the Himalaya and east of the Hindu Kush. It contains the second highest peak in the world, K2, which lies on the border between Pakistan and China.

ANSWER: **Karakoram**

[10] The Taklamakan Desert is bordered to the south by the Kunlun Shan range and to the north by this other Central Asian range. Its northeastern extent connects to the Mongolian Altai Mountains.

ANSWER: **Tian Shan** or **Tien Shan**

3. In the fourth terrace of this place, the protagonist falls asleep and dreams of Sirens. For ten points each:

[10] Name this mountain that the protagonist climbs with his companion Virgil. It appears in the second book of a three-part work written in terza rima.

ANSWER: **Purgatorio** (or **Purgatory**)

[10] *Purgatorio*, along with *Inferno* and *Paradiso*, makes up one of the three parts of the *Divine Comedy* written by this Italian poet.

ANSWER: **Dante Alighieri** (accept either)

[10] While in this Circle of Hell, Dante learns that people who commit suicide are clawed by harpies and turned into trees. Dante also comes across the fiery Phlegethon River in this circle.

ANSWER: **Seventh** Circle of Hell

4. The “Whispering” Gallery and a lantern are part of the top of this building, which was based on the “Great Model.” For ten points each:

[10] Name this London cathedral named after a religious figure from Tarsus. In 1665, it was destroyed by a giant fire.

ANSWER: **St. Paul’s** Cathedral

[10] This English designer of the Library at Cambridge’s Trinity College is most famous for starting the rebuilding of St. Paul’s Cathedral in 1669.

ANSWER: Sir Christopher **Wren**

[10] Sir Christopher Wren enlisted the aid of this other English architect to rebuild St. Paul’s Cathedral. Andrea Palladio’s influence on this architect can be seen in his Banqueting House in Whitehall.

ANSWER: Inigo **Jones**

5. The king of Gath, Achish, gave the city of Ziklag to this Biblical figure. For ten points each:

[10] Name this second king of Israel and father of Solomon. He is known for an event at the Valley of Elah, at which he killed a Philistine named Goliath.

ANSWER: **David**

[10] The Book of Samuel details the death of this son of David after he rises up against his father. He is killed by Joab in a forest in Ephraim.

ANSWER: **Absalom**

[10] David is foretold by the prophet Nathan of three punishments he would receive partly for killing this man, the husband of Bathsheba.

ANSWER: **Uriah** the Hittite

6. For ten points each, answer these questions about Rome's uneasy dominion over a certain area:

[10] During Tiberius's reign, Rome banned and undertook a massive campaign to attempt to wipe out the practices of the Druids, who lived on this large island. This island was later ruled by kings like Henry VIII.

ANSWER: Great **Britain** (or **Britannia**)

[10] In the late 1st century AD, this queen of the Iceni led a revolt against Rome with the help of the close Trinovante tribe. Her uprising would be quelled by Suetonius Paulinus at Watling Street.

ANSWER: **Boudica** (accept variations on the spelling)

[10] The leader of the Catuvellauni tribe, Caratacus, also led rebellions against Rome. After he was caught, he was spared the death penalty by this then Roman emperor who ruled from 41 to 54 AD.

ANSWER: Tiberius **Claudius** Caesar Augustus Germanicus

7. This man founded the organization he is most famous for with Dolores Huerta. For ten points each:

[10] Name this Mexican-American social activist who established the United Farm Workers, a Latino civil rights organization with the motto "Si, se puede."

ANSWER: Cesar Estrada **Chavez**

[10] Cesar Chavez was a supporter for a nationalistic movement in which Mexican-Americans adopted this slang-term to describe themselves. The Brown Berets formed by David Sanchez supported this movement.

ANSWER: **Chicano** (or **Chicanismo**)

[10] Cesar Chavez also led a five-year strike in order to demand minimum wage from grape-growing businesses in this California city.

ANSWER: **Delano**

8. A letter written by this character reveals the reason for Danvers Carew's death. For ten points each:

[10] Name this scientist who loses control of deciding when to transform into his monstrous alter ego, Mr. Hyde.

ANSWER: Dr. Henry **Jekyll**

[10] Dr. Jekyll and Mr. Hyde are creations by this Scottish novelist. This author also wrote about Captain Flint and Long John Silver in his *Treasure Island*.

ANSWER: Robert Louis **Stevenson**

[10] In *The Strange Case of Dr. Jekyll and Mr. Hyde*, a character named Mr. Utterson has this occupation. In a Franz Kafka work about Joseph K., Herr Huld has *this* job.

ANSWER: **lawyer** (or **attorney** or similar)

9. Most of the pieces in a collection based on this country contain the lassan and the friska. For ten points each:

[10] Name this European country which inspired a set of nineteen piano pieces based on Magyar music. This nation lends its name to those “rhapsodies.”

ANSWER: **Hungary**

[10] The *Hungarian Rhapsodies* are by this piano virtuoso Hungarian composer, who also quoted the “Dies Irae” at the beginning of his harsh-sounding *Totentanz*.

ANSWER: Franz (Ferenc) **Liszt**

[10] This *Hungarian Rhapsody* is the most famous one of the nineteen compositions and is in the key of C-sharp minor like the one before it. It is dedicated to Laszlo Teleki.

ANSWER: *Hungarian Rhapsody no. 2* (accept **S.244/2**)

10. The Vietnam War has been a popular topic for Hollywood movies. For ten points each:

[10] This 2008 comedy starred Ben Stiller, Robert Downey Jr., and Jack Black as actors in a Vietnam War movie that get lost in the jungle and fight a drug kingpin.

ANSWER: **Tropic Thunder**

[10] This 1979 Francis Ford Coppola film follows the journey of Captain Benjamin Willard, who is sent down the Nung River to find the presumed insane Colonel Walter Kurtz.

ANSWER: **Apocalypse Now**

[10] This Stanley Kubrick-directed film whose title refers to a type of bullet features the adventures of Joker Davis and his friends as they experience basic training and combat during the Tet Offensive.

ANSWER: **Full Metal Jacket**

11. For ten points each, name these technologies used to study cells:

[10] A common method of taking cells apart called cell fractionation uses this device, which holds test tubes and spins at rapid speeds in order to separate parts of the cell.

ANSWER: **centrifuge**

[10] The “electron” type of these devices sends a beam through the specimen in question. These devices typically consist of a tube through which the user can look through.

ANSWER: **microscope**

[10] This type of microscopy is used to find the locations of particular molecules in the cell. It relies on the absorption of short ultraviolet wavelengths and the emission of longer visible light wavelengths by the molecules in the cell.

ANSWER: **Fluorescence** microscopy

12. This process takes advantage of difference in components' boiling points. For ten points each:

[10] Name this separations technique which often uses a namesake column to boil a mixture, then condense it into a different flask. The “fractional” variant of it is used with petroleum.

ANSWER: **distillation**

[10] In this technique, often accompanying distillation, the condensed vapor is returned to top of the distillation column, cooling the system down and improving yield and efficiency.

ANSWER: **refluxing** (accept word forms)

[10] Distillation is usually ineffective at separating these mixtures, which produce a vapor which has the same components as the original mixture. A 96% ethanol, 4% water mixture is an example of a positive one.

ANSWER: **azeotropes**

13. In the eleventh section of this work, the piano players are featured by just playing their scales. For ten points each:

[10] Name this 1886 collection of fourteen movements. It includes a section entitled “Fossils” and features a prominent cello solo in its movement depicting the jumping of a swan.

ANSWER: **Carnival of the Animals** (or **Le carnaval des animaux**)

[10] *Carnival of the Animals* is a piece by this 19th century French Romantic composer who also depicted the rattling of skulls in his *Danse Macabre*.

ANSWER: Charles-Camille **Saint-Saëns**

[10] The beginning of Saint-Saens’s *Danse Macabre* features this instrument playing a D twelve times to depict the ringing of a clock at midnight.

ANSWER: **harp**

14. The title object of this poem is located “beside the white chickens.” For ten points each:

[10] Name this very short poem in which “so much depends” on the title object, which is “glazed with rain water.”

ANSWER: “The **Red Wheelbarrow**”

[10] “The Red Wheelbarrow” is a work by this American poet.

ANSWER: William Carlos **Williams**

[10] This William Carlos Williams poem begins “I have eaten the plums that were in the icebox” and asks the reader to “forgive me” because they were “delicious.”

ANSWER: “**This is Just to Say**”

15. One attempt to create these entities in France relied on the creation of units called “phalansteries.” For ten points each:

[10] Name these communities led by people like Henri de Saint-Simon. In the United States, examples of them included the Oneida Community.

ANSWER: **utopian** society (accept equivalents like “Utopian communities”)

[10] This failed utopian society based in Massachusetts was founded by preacher George Ripley and was based on the principles of socialist Charles Fourier.

ANSWER: **Brook Farm**

[10] Another experimental utopian society named New Harmony was founded in 1825 by this Welsh socialist leader, who also worked with David Dale to establish an important cotton mill at New Lanark.

ANSWER: Robert **Owen**

16. Answer the following about how computers store numerical data, for ten points each:

[10] Computers rely on this base-2 number system which stores information as a series of 1s and 0s corresponding to “ons” and “offs” respectively.

ANSWER: **binary** number system

[10] A common precision used in programming used to allocate space for large numbers is this one, which reserves two memory spaces for the number. This format can store eight bytes, or numbers less than 2 to the 64th power.

ANSWER: **double** precision

[10] Binary numbers are often represented using two’s complement notation, which uses a single one in front of the binary digits to represent that a number has *this* property.

ANSWER: it is **negative** (accept same-knowledge equivalents)



17. The coefficient of friction is equal to the frictional force divided by this other force. For ten points each:

[10] Identify this force which acts perpendicular to the surface an object is resting on. For an object at equilibrium on a non-sloped surface, this force has the same magnitude as the weight.

ANSWER: **normal** force

[10] The normal force can be depicted by using an upward or diagonal facing arrow on these simple representations of all the forces acting on an object.

ANSWER: **free-body diagram** (or **fbd**)

[10] The normal force for an object on a sloped surface can be found by multiplying the weight by this function of the angle of the ramp to the horizontal.

ANSWER: **cos**(theta) (or **cosine**(theta) or **cos**(angle))

18. One book about this event begins with the title *If This Is a Man* and was written by an Italian survivor named Primo Levi. For ten points each:

[10] Name this event which was faced by the thirteen year-old Anne Frank, who was sent to the Bergen-Belsen concentration camp after writing her famous diary.

ANSWER: The **Holocaust**

[10] This Romanian-born author and Holocaust survivor retold his experiences in Auschwitz in his 1960 account entitled *Night*.

ANSWER: Eliezer "Elie" **Wiesel**

[10] One character escapes the Nazi occupation of Prague in a book by Michael Chabon about the “amazing adventures” of these two characters, who create the Monitor and Luna Moth for their comic books.

ANSWER: (The Amazing Adventures of) **Kavalier** and **Clay** (prompt on partial answer)

19. Theodor Herzl is considered to be the father of this movement. For ten points each:

[10] Name this political movement which is the subject of the newspaper *The Jewish State*, referring to this movement’s goal of an independent home for the Jewish people.

ANSWER: **Zionism** (or **Zionist** or other word forms)

[10] This former British Prime Minister is the namesake of a “declaration” addressed to Baron Rothschild that assured he would help in the Zionist push for an independent Jewish State.

ANSWER: Arthur James **Balfour**, 1st Earl of Balfour

[10] Herbert Samuel’s *The Future of Palestine* influenced the Zionist policies of this 1916 agreement, in which Britain’s David Lloyd George negotiated with France about dividing up the former Ottoman Empire.

ANSWER: **Sykes-Picot** Agreement (accept **Asia Minor** Agreement)

20. These events are split into “rising” and “falling” phases depending on whether there is an influx or outflow of sodium or potassium ions. For ten points each:

[10] Name these brief events that occur when voltage-gated sodium channels are opened due to an increase in depolarization, causing a large change in membrane voltage.

ANSWER: **action potential**

[10] The depolarization that causes an action potential occurs on these cells, which possess dendrites and axons that relay signals to and from other cells.

ANSWER: **neurons** (accept “nerve cell”)

[10] On neurons, action potentials can only occur at these regions because the fluid touches the axon only at them. These gaps between myelinated axons cause current to “jump” in a process called saltatory conduction.

ANSWER: **nodes of Ranvier** (prompt on partial answer)

21. They are designated  $n$ ,  $l$ ,  $m$ -sub- $L$  and  $m$ -sub- $s$ . For ten points each:

[10] Name these numbers which identify an electron in an atom. The Pauli Exclusion Principle states that no two electrons may have the same set of four of these.

ANSWER: quantum numbers

[10] The “ $s$ ” in  $m$ -sub- $s$  stands for this property of an electron, its intrinsic angular momentum. All fermions have half-integer values for this property.

ANSWER: spin

[10] This quantum number identifies the shape of the orbital in which an electron is located. Alternatively, it can measure the number of nodes which pass through the nucleus, and equals 1 for a  $p$  orbital.

ANSWER: azimuthal quantum number (or angular momentum quantum number; prompt on  $L$ )