

**2021 AQBL February  
Packet 1**

1. **The quantum mechanical operator for this quantity is given by negative  $i$  times  $\hbar$  multiplied by the curl of position. The expansion of the total eigenstates for this value due to coupling contains Clebsch-Gordan coefficients. It's not shape, but the Azimuthal quantum number describes this property for an electron. Kepler's second law implies this quantity's (\*) conservation, which arises as a result of rotational invariance as given by Noether's theorem. Torque is equal to the time derivative of this quantity, which is equal to the moment of inertia multiplied by angular velocity. For 10 points, name this rotational analogue of linear momentum.**  
ANSWER: **angular momentum** (anti-prompt on spin; do not accept or prompt on linear momentum)  
<DS, Physics>
2. **This author discussed an object that would "haunt thy days and chill thy dreaming nights" in "This Living Hand", and in another poem stated that he saw "a fading rose" and a lily with "anguish moist and fever-dew" on a "knight-at-arms" as well as "pale kings and princes too." This poet of the ballad "La Belle (\*) Dame sans Merci" asked "Was it a vision, or a waking dream?" and ended with the question "Do I wake or sleep?" in a poem about a certain bird. This poet asserted that "Beauty is truth, truth beauty" in his most famous poem. For 10 points, name this British author of "Ode to a Nightingale" and "Ode on a Grecian Urn."**  
ANSWER: John **Keats** <AN, British Literature>
3. **This country was once led by the physician Ramon Grau San Martin, who succeeded a ruler who later led a 1952 coup after anti-communist leader Eduardo Chibas committed suicide. After Lucky Luciano was released from prison, he met with Meyer Lansky and other mafia leaders at a casino in this country. After leading an attack on the Moncada Barracks, a future leader of this country gave the speech "History Will (\*) Absolve Me." This country's relations with the U.S. deteriorated after it nationalized all American property, including sugar plantations. For 10 points, name this country where Fulgencio Batista was overthrown by Che Guevera and Fidel Castro.**  
ANSWER: Republic of **Cuba** <MB, World History>
4. **A winged female figure on the left of this painting was identified by Vasari as Aura, the Titan responsible for the breeze. Though it may not have been commissioned by them, this painting in the Uffizi has been controversially argued to have been propaganda for the Medicis. The winged Zephyr also blows a wind on the left of this painting set in Cyprus or Cythera, while on the right of this painting, the (\*) spring Hora carries a pink cloak and lifts it around the title figure, who is standing nude. For 10 points, name this Sandro Botticelli painting depicting the title goddess of love arriving on a seashell.**  
ANSWER: *The **Birth of Venus*** <MB, Visual Fine Arts>
5. **Description Acceptable. Between 1497 and 1597, these people were allowed to move on the November feast day of Yuri's Day. A 1797 declaration by Paul I limiting these people's obligatory work requirement to just three days a week was largely ignored, and they were eventually required to provide payments for land that were abolished in 1907 under Nicholas (\*) II. These people lived in *mirs* or *obschinas* after gaining rights belonging to citizens in the 1861 Emancipation Reform, which was signed by Alexander II. For 10 points, name these peasants tied to specific land in Russia.**  
ANSWER: **serfs** (accept **Russian peasants** or descriptions of **peasants** in **Russia** because while there was a class of free peasants most were in fact serfs) <MB, European History>

6. **Dioxygenase can add an oxygen atom to this compound, which is then reduced twice by NADH to form catechol. A form of this compound with an amine substituent is used in Nissl staining. Pyrene is formed by fusing four of these molecules together. Although this carcinogen was used to degrease metal, it was later replaced with one of its derivatives, (\*) toluene.** Trimerization of acetylene yields this molecule. This molecule's structure was first hypothesized by August Kekulé, who dreamt of a snake biting its own tail. For 10 points, name this cyclic organic molecule with three single and three double bonds, that has chemical formula C<sub>6</sub>H<sub>6</sub>.

ANSWER: **benzene** (prompt on C<sub>6</sub>H<sub>6</sub> before mention) <CS, Chemistry>

7. **The most recent game in this series has a secret ending reached by finding all 13 “captured memories,” and like other games in this series, allows players to be attacked by flocks of cuckoos. Weapons in this series include the Bow of Light and Master Sword, whose formation is described in *Skyward* (\*) *Sword*.** One game in this series focuses on the encroaching Twilight Realm, while in another game in this series, players learn songs on the *Ocarina of Time*. The primary antagonist of this series, Ganondorf, attempts to conquer Hyrule and capture the titular princess. For 10 points, name this Nintendo series starring Link, whose latest entry is *Breath of the Wild*.

ANSWER: The **Legend of Zelda** <MB, Pop Culture>

8. **A character in this novel goes crazy and believes days are repeating themselves after believing he has invented perpetual motion; he then only speaks in Latin and is tied to a tree until his death. In this novel, a Colonel from a civil war crafts golden fish in his workshop and has 17 sons all sharing his name. One character in this book has an incestuous relationship that produces a child with the (\*) tail of a pig and leads to the death of Amaranta Ursula.** A list of misfortunes predicted by the gypsy Melquiades is read by Aureliano Buendia as the town of Macondo is destroyed at the end of, for 10 points, what novel by Gabriel Garcia Marquez?

ANSWER: **One Hundred Years of Solitude** (or **Cien Anos de Soledad**; accept **A Hundred Years of Solitude**) <MB, World Literature>

9. **A composer from this country called for six offstage flugelhorn in a movement of a suite depicting the “Pines” and “Fountain” of this country’s capital. A composer from this country refused to play a piece partly named for this country due to there being too many rests in the viola part. This country is home to a composer who included movements such as “The Hunt” and (\*) “The Devil’s Laughter” in a set of 24 caprices for violin.** A composer from this country wrote accompanying sonnets for four movements in his *The Contest Between Harmony and Invention*. For 10 points, name this country home to Ottorini Respighi, Niccolò Paganini, and the composer of *The Four Seasons*, Antonio Vivaldi.

ANSWER: **Italy** (accept Republic of **Italy**) <GB, Auditory Fine Arts>

10. **The *clinamen*, or swerve, of these entities was discussed in the Epicurean poem *De Rerum Natura* by Lucretius. Leucippus may have been the first to posit a theory of these entities, though the idea that the world is made of the void and these entities is attributed to Democritus. An early model of these entities analogized their structure to planetary (\*) orbits; that model was developed by Niels Bohr.** The name of these entities comes from Greek words meaning indivisible. For 10 points, name these entities, which, according to our modern understanding, are composed of electrons orbiting a nucleus.

ANSWER: **atoms** <ADV, Philosophy>

11. **In variation of parameters, the denominator of each particular solution to a differential equation is this operation applied to a structure of known coefficients. Abel's identity explicitly expresses the Wronskian type of this operation, which is used to show linear independence. The Jacobian type of this operation is used when changing variables in integral transformations. This scalar value can be found through expansion by cofactors and encodes properties of a (\*) linear transformation. This operation yields the volume of a parallelepiped, which is zero for a singular matrix. For 10 points, identify this matrix operation, which is "ad minus bc" for a 2x2 matrix.**

ANSWER: determinant <DS, Math>

12. **The opening of a cable railway at this physical feature was commemorated with the folk song "Funiculi, Funicula," and two letters addressed to Tacitus hold the only eyewitness account of an event at this physical place. Spartacus's forces were first sieged at this location during the Third Servile War, where rebels used vines to descend cliffs. (\*) Pliny the Younger escaped an event at this physical feature that led to the death of Pliny the Elder during the reign of Titus in 79 AD. For 10 points, name this volcano near Naples that destroyed Herculaneum and Pompeii.**

ANSWER: Mount Vesuvius <MB, Other History>

13. **An airport built on an artificial island in this country includes the Renzo Piano-designed Terminal 1. In this country, the Imperial Hotel designed by Frank Lloyd Wright survived a 1923 earthquake and overlooks the nearby Ginza shopping district. Many homes in this country are home to colorful papers known as *washi* and are noted for the use of (\*) sliding doors. A dome in this country serves as a memorial to lives lost during the atomic bombing of Hiroshima. For 10 points, name this country where many skyscrapers can be found in Tokyo.**

ANSWER: Japan <AK, Geography>

14. **In a story by this author, lovers jump between the slowly-separating Earth and Moon; that story is narrated by the primordial being Qfwfq [kiff-wiff-kuh]. The narrator of a novella by this author of "The Distance of the Moon" claims that "every time I describe a city I am saying something about Venice;" that book is framed as a conversation between Marco (\*) Polo and Kublai Khan. The opening chapters of a series of different books are included in the even-numbered chapters of a novel by this author narrated by "you, the reader." For 10 points, name this Italian author of *Invisible Cities* and *If On a Winter's Night a Traveler*.**

ANSWER: Italo Calvino <MB, European Literature>

15. **During weddings in this religion, the groom presents the bride with gifts in a ritual known as *Adarni*. A 15-year old hermaphrodite named Gayomart is considered the first human being in this religion. Members of this religion, who are initiated in the *Navjote* ceremony, are taken to either the House of Song or the House of Lies after they walk across the Chinvat (\*) Bridge. Adherents of this religion are buried atop Towers of Silence and believe in a conflict between Ahura Mazda and its evil counterpart Angra Mainyu. For 10 points, name this dualistic religion that originated from Persia.**

ANSWER: Zoroastrianism <AK, Religion>

16. **On one album by this musician, tape loops and other *musique concrète* inspired techniques were employed by his frequent collaborator Teo Macero on tracks like “Pharaoh’s Dance.” That album was part of this musician’s “electric period” in which he made albums like *Jack Johnson* and *In A Silent Way* that pioneered jazz fusion. The arranger (\*) Gil Evans worked on one of this musician’s albums that includes a version of the Adagio from *Concierto de Aranjuez*. A modal jazz album by this musician included tracks like “Freddie Freeloader” and “So What.”** For 10 points, name this jazz trumpeter of the albums *Bitches’ Brew* and *Kind of Blue*.  
ANSWER: Miles Davis <AB, Other Fine Arts>
17. **During this period, the case *United States v. Cruikshank* overturned convictions under the Enforcement Act following the Colfax Massacre. Oliver Otis Howard led an agency that was countered by the passage of black codes during this period. During this period, opposing factions advocated for the “ironclad (\*) oath” of the Wade-Davis Bill and the more-lenient “ten percent plan.”** The derogatory terms “scalawag” and “carpetbagger” referred to people with northern loyalty during, for 10 points, what period ended by the Compromise of 1877, and which followed the Civil War?  
ANSWER: Reconstruction <MB, American History>
18. **It’s not hemoglobin, but the first compound in the synthesis of this molecule is 5ALA. The most recent structure of this molecule was determined by Fleming in 1967. A fifth type of this molecule was discovered in stromatolite-forming cyanobacteria. This chlorin contains ligands attached to a central magnesium ion. (\*)** Photosystems II and I contain two dimers of this molecule, the first of which excites an electron to enter the second dimer; those dimers are P680 and P700. This molecule is embedded in thylakoid membranes. For 10 points, name this plant pigment that reflects green light and absorbs light to produce energy for photosynthesis.  
ANSWER: chlorophyll <CS, Biology>
19. **“On being asked, whence is the flower,” this author wrote about a “rival of the rose,” a “fresh Rhodora in the woods.” In an essay, this author states “whoso would be a man must be a nonconformist” and “a foolish consistency is the hobgoblin of little minds.” This author called for a national poet in his essay “The (\*) Poet,” and encouraged readers to nurture and follow their individuality in “Self-Reliance.”** This author described a group of “embattled farmers” and coined the phrase “shot heard round the world” in his “Concord Hymn.” For 10 points, name this Transcendentalist and friend of Henry David Thoreau.  
ANSWER: Ralph Waldo Emerson <MB, American Literature>
20. **In one account, this figure helps his son construct a chest to survive a flood meant to end the Bronze Age. In the Trick at Mecone, this figure set precedent for sacrifices by offering Zeus a choice of meat inside an ox’s stomach and a set of bones wrapped in fat. This son of Iapetus and father of (\*)** Deucalion molded humans out of clay, and had his liver eaten out by an eagle every day until he was rescued by Heracles from Mount Elbrus. For 10 points, name this Titan who is chained to a rock after stealing fire and giving it to humans.  
ANSWER: Prometheus <MB, Mythology>

### Tiebreaker/Extra Question

This quantity for fluid particles is known as its “material” type, is the sum of its “unsteady” and “convective” types, and makes the Navier-Stokes equations nonlinear. Charge and this quantity are both squared to find the power radiated by point charges. When particles are repeatedly deflected, they gain energy by experiencing the Fermi form of this quantity. In circular motion, this quantity is equal to the radius times the rotational (\*) velocity  $W$ . This quantity can be calculated from force divided by mass, according to Newton’s Second Law. For 10 points, name this quantity measured in meters per second squared, the change in velocity.  
ANSWER: **acceleration** (accept more specific types of acceleration) <MB, Tiebreakers>