

Bulldog High School Academic Tournament 2020 (XXIX): scary vibes

Written by Yale Student Academic Competitions (Zach Alvarez, Joe Class, Stephen Eltinge, Ben Colon-Emeric, Michał Gerasimiuk, Mauricio Gonzalez-Sanchez, Hasna Karim, Michael Kearney, Sophie Lai, Alisia Pan, Matt Pecoraro, David Rubin, Varun Sikand, Daniel Sheinberg, Jeremy Sontchi, Sebastian Torres, James Wedgwood, and Bo You) with Olivia Murton and Annabelle Yang

Edited by Hasna Karim, Michael Kearney, James Wedgwood, and Annabelle Yang, with Jacob Reed and Stephen Eltinge

Packet 10 Tossups

1. **An acceleration-dependent “interpolating function” modifies the “dynamics” named for this scientist in a model proposed by Mordehai Milgrom. This scientist coined the term “centripetal force” and answered several questions posed by Edmund Halley in the tract *De Motu*. This scientist simplified his analysis of one problem by proving the (*) shell theorem. Robert Hooke accused this man of plagiarizing his own work on inverse square laws. This man identified a force that attracts all bodies in proportion to their mass in his *Principia*. For 10 points, name this English discoverer of the law of universal gravitation and three laws of motion.**

ANSWER: Isaac **Newton** <SE>

2. **Description acceptable. Hilarion is forced to perform this action by the Wilis, spirits of women jilted by unfaithful lovers, in Adolphe Adam’s *Giselle*. In another ballet, this action is performed as the time signature changes between unusual ones like 3/16, 2/16, and 2/8, and it is performed by a character who is selected after being caught in a perpetual circle. At the conclusion of this action, the bottom four notes of the final chord spell out (*) D-E-A-D. The “Evocation” and “Ritual Action of the Ancestors” precede this action. For 10 points, the Chosen One performs what action, involving her ultimate demise, to conclude Part 2, “The Sacrifice,” of Igor Stravinsky’s *The Rite of Spring*?**

ANSWER: **dancing to death** [prompt on **dancing**, accept **dancing to exhaustion** until “Wilis”]

3. **This god is associated with the calendar year “One Reed.” In some depictions, this god carries a piece of conch shell called the “wind-jewel.” This god’s rival tricked him into drinking the alcoholic beverage pulque [pool-KAY], after which he slept with his sister. This god self-mutilated to provide the blood that resurrected the (*) fifth version of mankind from the bones of the fourth. In one myth, this god’s heart became the morning star after he immolated himself. This god was the twin brother of the psychopomp Xolotl [show-LOT-ull]. For 10 points, name this Aztec god who feuded with Tez-cat-li-po-ca and took the form of a feathered serpent.**

ANSWER: **Quetzalcoatl** <HK>

4. **A ruler of this city introduced the *grosso* silver coin after sacking the city of Zara. This city’s Jews were forced to live in an abandoned foundry, whose name is perhaps the origin of the English word “ghetto.” Each Ascension Day, the ruler of this city boarded the “Bucentaur” to throw a ring into the (*) ocean, symbolically marrying the sea. A blind ruler of this city led the Fourth Crusade, which sacked Constantinople. This city’s shipyard was called the “Arsenal.” Saint Mark was the patron saint of this city, whose rulers included Enrico Dandolo. Doges ruled—for 10 points—what maritime Italian city best known for its canals?**

ANSWER: Most Serene Republic of **Venice** [or la Serenissima Repubblica di **Venezia**] <MK>

5. In one story by this author, Adolphe Le Bon is accused of clubbing a woman to death and shoving her daughter's corpse into a chimney. In another story by this author, the protagonist finds the title object in a card-rack in Minister D—'s apartment. In a short story by this author, a tuft of orange hair is found in Madame L'Espanaye's [leh-spa-nay's] hand, prompting the conclusion that an (*) orangutan committed the title acts. This author created the detective C. Auguste Dupin, who appears in such stories as "The Purloined Letter" and "The Murders in the Rue Morgue." For 10 points, name this American author of "The Tell-Tale Heart."

ANSWER: Edgar Allan Poe <SL>

6. This river's headwaters are found in the Bayan Har Mountains, and softshell turtles native to this river's basin are often eaten in soup. The basin of this river, whose largest tributary is the Wei, was the birthplace of a civilization that used tortoise shells and the shoulder blades of oxen to create (*) "oracle bones." This river carries large amounts of silt where it descends from the Loess Plateau. This river, which is nicknamed its nation's "Sorrow," was linked to another river to the south by a Grand Canal built during the Sui dynasty. For 10 points, name this colorfully-named river, the second longest in China after the Yangtze.

ANSWER: Yellow River [or Huang He] <HK>

7. During the isothermal expansion of an ideal gas, the work done by the system is equal to nRT times this function of the final volume divided by the initial volume. The standard change in Gibbs free energy is equal to negative RT times this function of the equilibrium constant. For a first order reaction, a plot of this function of (*) concentration versus time yields a straight line. Taking this function of the acid dissociation constant yields the pK_a , and negative one times this function of the concentration of protons in solution yields pH . For 10 points, name this function, the inverse of exponentiation.

ANSWER: logarithm [or log; accept natural logarithm or ln] <MP>

8. In one work, an omniscient dragon tells this character that he is "mankind" and to "seek out gold and sit on it." In the same novel, this character visits the funeral of a blind poet known as the Shaper. In another work, this character's main foe puts his "shoulder and arm" on display after killing him. This character is described as a descendant of (*) Cain and, in a novel by John Gardner, curses his existence and explores nihilism. In the original work in which he appears, this character attacks Heorot and is defeated in hand-to-hand combat by a hero who later kills his mother. For 10 points, name this first antagonist of the epic *Beowulf*.

ANSWER: Grendel [do not accept or prompt on "Grendel's mother"] <MGS>

9. One film by this man begins with a discussion of the Madonna song "Like a Virgin," followed by an argument over Mr. Pink's policy of not tipping. This man's first paid writing assignment was the script of the 1996 cult film *From Dusk till Dawn*. Two characters who refer to each other as "Pumpkin" and "Honey Bunny" hold up a restaurant in one of this director's films, in which (*) Jules Winnfield is played by his frequent collaborator Samuel L. Jackson. Harvey Keitel starred in this man's directorial debut *Reservoir Dogs*, which features his trademark non-linear storytelling and gratuitous violence. For 10 points, name this man who directed *Pulp Fiction*.

ANSWER: Quentin Tarantino <ZA>

10. **The earliest occurrence of this action is celebrated as the First Luminous Mystery. In Roman Catholicism, people who want to, but cannot, complete this action are believed to have done it “by blood” or “through desire.” According to Mormons, this action may be performed on the (*) dead.** Aspersion and affusion are methods of performing this action. A saint associated with this action was the son of Elizabeth, a relative of the Virgin Mary. This is the first sacrament of initiation into the Roman Catholic church. For 10 points, name this sacrament in which a participant is typically immersed in water

ANSWER: baptism [or baptism of Christ; John the Baptist; accept equivalents like being baptized] <MK>

11. **One of these objects appears atop a stack of newspapers next to a bird with a humanoid face in an M. C. Escher still-life. René Magritte painted an eyeball framing a cloudy, blue sky in a painting titled for a “false” one of these objects. A mustached man and the green shoes of a trapeze artist appear in one of these objects, located behind a (*) barmaid who stands at a counter full of wine bottles in Edouard Manet’s *A Bar at the Folies-Bergère*. Queen Mariana and King Philip IV appear in one of these objects placed on a back wall in *Las Meninas*.** For 10 points, name these objects, a convex one of which hangs on the wall in the *Arnolfini Wedding*.

ANSWER: mirrors [or *Still Life with a Spherical Mirror*; or *The False Mirror*] <SL>

12. **In 2012, archaeologists rediscovered the remains of this battle’s losing commander, who died during it, and found he had scoliosis. At this battle, the Earl of Northumberland did not engage his troops, while the forces of Lord Stanley took up a position independent of the other two armies. This battle occurred in Leicestershire near Ambion Hill. This battle ended a conflict with engagements at (*) St. Albans and Tewkesbury.** During the fighting, the loser of this battle shouted “my kingdom for a horse,” at least according to a Shakespeare play. The Tudor Dynasty began after this battle. Henry VII defeated Richard III at—for 10 points—what 1485 battle that ended the Wars of the Roses?

ANSWER: Battle of Bosworth Field <MK>

13. **The Dirac delta function can be described as the limit of one of these objects as its variance goes to 0. One of the assumptions for an ordinary least squares regression is that error terms are distributed according to this structure, which has a probability density function equal, up to constants, to e to the negative x squared. The mean of many independent samples of a random variable tends toward this (*) distribution according to the central limit theorem. This probability distribution is described by the 68-95-99.5 rule.** For 10 points, name this probability distribution colloquially referred to as a “bell curve.”

ANSWER: normal distribution [accept Gaussian distribution; prompt on bell curve before “bell curve”] <BY>

14. **A piece titled for this event features an offstage oboe and soprano in its “Echo Aria” and is composed of six cantatas. Aside from ballets, Adolphe Adam is best-known for a song written for this occasion. A piece titled for this occasion ends with a G-major “Pastorale ad libitum” in 12/8 time and is the eighth concerto in Arcangelo Corelli’s Opus 6. A piece for this occasion represents a group of (*) shepherds with a movement labelled “Pifa.”** The tune *Adeste Fideles* is performed on this occasion. This day’s story is recounted in Part 1 of Handel’s *Messiah*. The chorus “For unto us a child is born” celebrates—for 10 points—what Christian holiday?

ANSWER: Christmas [or December 25; accept *fatto per la notte di Natale*; accept Christmas Oratorio or Weihnachtsoratorium; accept “Cantique de Noël”] <AY>

15. **Dr. Murray Stein, who works for an institution named for this man, condensed this man's theories into a primer called *Map of the Soul*. The Gnostic section *Seven Sermons to the Dead* closes this thinker's *Red Book*, which was not published until 2009. He described meaningful coincidences using the term (*) "synchronicity."** The Myers-Briggs personality test is based on this psychoanalyst's work on introversion and extroversion. This man described personality in terms of the shadow and the persona, and he explained the anima and animus as archetypes. For 10 points, name this Swiss founder of analytic psychology who theorized the collective unconscious.
ANSWER: Carl Gustav **Jung** <HK>

16. **42 pathways converged from this empire's borders to its most sacred temple, the *Coricancha*. That temple, also called the House of the Sun, was rebuilt with riches taken from this empire's conquest of the neighboring Chimú peoples. This empire used a system of labor conscription called *mit'a*. In this empire, (*) messengers used a system of "talking knots" called *quipu* to transmit information. This empire built the *Qhapaq Ñann*, an extensive structure of royal roads over which llamas passed. The Quechua are descendants of—for 10 points—what Andean civilization with capital at Cuzco?**
ANSWER: **Incan** Empire <MGS>

17. **SYBR Green is a dye commonly used in a quantitative version of this technique which can track the creation of specific fragments. Using specially designed primers can yield gene constructs for proteins containing deletions or point mutations in a site-directed "mutagenic" variety of this technique. A version of this technique used for (*) expression profiling uses reverse transcriptase to yield DNA sequences from RNA. Isolation of a protein from the bacterium *T. aquaticus* has made the thermal cycling involved in this procedure far more efficient; that protein is Taq polymerase. For 10 points, name this laboratory technique used to amplify DNA sequences.**
ANSWER: **PCR** [or **polymerase chain reaction**; accept specific types of PCR such as **qPCR** or **RT-PCR**] <HK>

18. **This author began a poem "I loved you once; perhaps that love has yet / to die," and his most famous opening line, "I still recall that wondrous moment," was probably addressed to Anna Kern. A warrior created by this writer is killed by Farlaf after he defeats Chernomor, a sorcerer with a magical beard, and rescues his bride. In addition to that fairytale, this author wrote about a man who loses his lover in a (*) flood and is chased by a statue. One story by this author features an engineer who goes insane and mutters "Three, seven, ace; three, seven, queen!" For ten points, name this author of "Ruslan and Ludmila," "The Bronze Horseman," and "The Queen of Spades."**
ANSWER: Alexander (Sergeyevich) **Pushkin** <MG>

19. **The Yellow Book provided a general outline for these structures, which were originally proposed in the "Pershing Map." Predominantly black neighborhoods like "Black Bottom" in Detroit were often demolished to make room for these structures. Lady Bird Johnson pushed for a bill that encouraged beautification of these structures, such as by (*) planting bluebonnets in Texas. The majority of federal fuel taxes fund bridges and these structures. The 1956 bill authorizing construction of these structures was partly based on Dwight D. Eisenhower's wartime observations of the *autobahn*. For 10 points, name these federally-funded transportation routes that include I-80 and I-90.**
ANSWER: **interstates** [or **interstate highways**; or **highways**; or **freeways**; or **roads**] <MGS>

20. In a novel by this author, the protagonist graduates from Martha Graham Academy and advertises the pill BlyssPluss, developed by his childhood friend Glenn. Another novel by this author ends with the main characters unsure if they are being taken by the Mayday Resistance or the Eyes. This author retold the *Odyssey* from the female perspective in *The (*) Penelopiad*. In a novel by this author, the protagonist encounters her friend Moira at a brothel that the Commander takes her to; that novel features Offred and is set in the Republic of Gilead. For 10 points, name this Canadian author of *Oryx and Crake* and *The Handmaid's Tale*.

ANSWER: Margaret Eleanor Atwood <JS>

Tiebreaker

Arthur Eddington coined a common metaphor for physical asymmetry with respect to this quantity, calling it “the only distinction known to physics.” Eliminating this quantity from an equation for an object’s final velocity yields Torricelli’s equation, which contains a “2-a-delta-x” term. For a bead sliding on a frictionless slope, minimizing this quantity is the goal of the (*) brachistochrone problem. Writing a dot over a variable indicates taking a derivative with respect to this quantity, such as differentiating velocity with respect to this quantity to obtain acceleration. For 10 points, the period of a pendulum is the total amount of what quantity that elapses in each cycle?

ANSWER: time [accept arrow of time; accept elapsed time] (Eddington coined the phrase “arrow of time.”) <SE>

Bonuses

1. Leaders of this group were known as “Grand Master Workmen.” For 10 points each:

[10] Name this labor union founded by Uriah Stephens, a Philadelphia tailor. Terence Powderly led this union at its height.

ANSWER: The Noble and Holy Order of the **Knights of Labor**

[10] In 1886, the Knights of Labor struck against the Missouri Pacific and Union Pacific railroads, which were owned by this man. This man caused the 1869 Black Friday scandal by cornering the gold market with Jay Fisk.

ANSWER: “Jay” **Gould** [or Jason **Gould**] <VS>

[10] The Knights of Labor faded in popularity after the Haymarket Square Riot, a violent labor demonstration in this city. According to legend, an 1871 fire broke out in this city after Mrs. O’Leary’s cow kicked over a lantern.

ANSWER: **Chicago** <VS/JS/MK>

2. This drawing was created in accordance with the principles laid out in Book 3 of the treatise *De architectura*. For 10 points each:

[10] Identify this iconic drawing, in which a scraggly-haired, naked man with four arms and four legs is inscribed inside a circle and a square.

ANSWER: **Vitruvian Man**

[10] The *Vitruvian Man* was the work of this Renaissance artist, known for his mastery of proportions as well as his propensity for inventions. This artist also painted the *Mona Lisa*.

ANSWER: **Leonardo da Vinci** [accept either name]

[10] Leonardo also drew *Head of an Angel*, a preparatory sketch for the androgynous angel in this painting. In this painting, the angel points at John the Baptist, while the title figure holds her hand over her infant son’s head.

ANSWER: *The Virgin of the Rocks* [or *Madonna of the Rocks*] <JW>

3. This 2017 horror film starring Daniel Kaluuya as Chris Washington won an Oscar for Best Original Screenplay the following year. For 10 points each:

[10] Name this film about a young African American man who reluctantly agrees to meet his white girlfriend Rose’s family, only to be faced with racist body snatchers.

ANSWER: **Get Out**

[10] *Get Out* was the directorial debut of this man, who is perhaps better known as half of a comedy duo on an eponymous Comedy Central sketch comedy show. He also directed *Us*.

ANSWER: Jordan **Peele**

[10] In *Get Out*, Chris is forcibly hypnotized by Rose’s mother Missy, sending his consciousness to this trance-like otherworld. Jordan Peele explained this place in a tweet saying that “[this place] means we’re marginalized.”

ANSWER: the **Sunken Place** <ZA>

4. Molecular clock techniques measure the rate at which organisms’ genomes accumulate these events. For 10 points each:

[10] Name these events which involve permanent changes to the nucleotide sequence of an organism’s genome. Molecular clocks use the rate of these events to estimate when various taxa genetically diverged.

ANSWER: **mutations**

[10] This small heme-containing protein’s sequence is commonly used as a molecular clock. This protein transfers electrons between Coenzyme Q and its namesake reductase in the inner membrane of the mitochondria.

ANSWER: **cytochrome c**

[10] The nucleotide sequence of the 16S subunits of these RNA-derived structures can also be used as molecular clocks for bacterial species. In eukaryotes, these structures contain a 40S and a 60S subunit.

ANSWER: **ribosomes** <HK>

5. On the Nepalese *stupas* of Sway-am-bhu-nath and Boudh-a-nath, pairs of this body part are painted facing each of the cardinal directions, symbolizing the Buddha's omniscience. For 10 points each:

[10] Name this body part. A third one of these body parts often symbolizes wisdom and enlightenment.

ANSWER: **eyes**

[10] According to legend, Sway-am-bhu-nath was created from one of these objects that emerged from a lake. A *sutra* named for these objects describes countless bodhisattvas springing from the earth and details an illustration of *upaya*.

ANSWER: **lotus** [or **Lotus Sutra**]

[10] Sites like Sway-am-bhu-nath and Boudh-a-nath are particularly important for this branch of Buddhism, a derivative of Vajrayana. This form of Buddhism is divided into Red Hat and Yellow Hat sects.

ANSWER: **Tibetan** Buddhism <AY>

6. A character's research on this subject is out of date because he cannot read German. For 10 points each:

[10] Name this subject studied by the Reverend Edward Casaubon. Dorothea Brooke marries the Reverend in order to assist him with his research on this subject.

ANSWER: **mythology** [or *The Key to All Mythologies*; accept **religion**, **Christianity**, etc; accept **syncretism**]

[10] Reverend Casaubon and Dorothea Brooke appear in this novel, subtitled "A Study of Provincial Life." In this novel, John Raffles blackmails the banker Nicholas Bulstrode.

ANSWER: **Middlemarch**, *A Study of a Provincial Life*

[10] This Victorian author wrote *Middlemarch*. In her novel *The Mill on the Floss*, the siblings Tom and Maggie Tulliver drown together.

ANSWER: George **Eliot** [or Mary Ann **Evans**] <MK>

7. The two-humped, critically endangered Bactrian camel is native to this region. For 10 points each:

[10] Name this desert which contains the city of Ulaanbaatar. Yurts are the dwellings of choice for many residents of this desert, which extends across Mongolia and northern China.

ANSWER: **Gobi** Desert

[10] The only remaining undomesticated species of these animals, though once extinct, has been reintroduced to specially protected regions of the Gobi. That species of this animal has the scientific name *Equus przewalskii*

[prez-WAL-ski].

ANSWER: **horse**

[10] Some animals native to this mountain range which merges into the high plateau of the Gobi Desert are the Siberian ibex and the snow leopard. This mountain range contains the headwaters of the Ob and Irtysh Rivers.

ANSWER: **Altai** Mountains <HK>

8. Answer some questions about clothing items that you might see in the traditional Pashtun communities of rural Afghanistan, for 10 points each:

[10] While men in leadership positions sometimes rock the karakul hat, a more common piece of headwear is this one, composed of wound cloth. This type of headwear is also worn by Sikhs.

ANSWER: **turban** [or **patke**; or **lungee**; accept **dastār**]

[10] This style of combination dress, consisting of baggy pants and a long shirt, is part of the traditional attire for a Pashtun man. In South Asia, it is generally worn by women, often with a dupatta.

ANSWER: **shalwar kameez** [or **salwar kameez**]

[10] The traditional attire of Pashtun women is the firaq partug, a variant of the shalwar kameez, but some Pashtun women also wear this full-body covering that has been controversially banned in countries like France.

ANSWER: **burqa** [accept **niqab**; do not accept or prompt on "hijab"] <JW>

9. In one novel in this cycle, Delphine and Anastasie send empty carriages to the funeral of their father, a deceased noodle-maker. For 10 points each:

[10] Name this literary cycle, whose novel *Le Père Goriot* features along with such works as *Eugénie Grandet*. This cycle features the recurrent characters Vautrin and Eugène de Rastignac.

ANSWER: *The **Human Comedy*** [accept *La **Comédie Humaine***]

[10] This nineteenth-century French author, notable for his commitment to realism and his extremely prolific career, wrote *The Human Comedy*.

ANSWER: Honoré de **Balzac**

[10] In this novel from *The Human Comedy*, Raphael de Valentin buys the title Sanskrit-inscribed object from a pawn shop. That object from this novel shrinks each time it grants him a wish.

ANSWER: ***The Wild Ass's Skin*** [or ***La Peau de chagrin***] <SL>

10. For 10 points each, name some films by Francis Ford Coppola that are *not* part of the *Godfather* trilogy.

[10] Marlon Brando improvised most of his lines as Colonel Kurtz in Coppola's *Apocalypse Now*, a Vietnam War-era adaptation of this Joseph Conrad novel.

ANSWER: ***Heart of Darkness***

[10] In this paranoid thriller, Gene Hackman plays a professional wire-tapper and eavesdropper, who thinks he discovers evidence of an impending murder after recording a couple in Union Square.

ANSWER: The ***Conversation***

[10] This Coppola film, with the same name as the novel on which it is based, follows the fight between rival gangs the Greasers and the Socs [SO-shiz]. It stars Rob Lowe as Sodapop.

ANSWER: The ***Outsiders*** <BCE>

11. The area enclosed by a cycle in its temperature–entropy diagram is equivalent to this quantity. For 10 points each:

[10] Name this quantity. For a Carnot cycle, the total for this quantity equals the amount of heat put into the system minus the amount of heat taken out.

ANSWER: thermodynamic **work**

[10] The expansion phase of the Carnot cycle that performs work is described by this term, which denotes zero heat transfer. Since the phases of the Carnot cycle described by this term are reversible, they are also isentropic.

ANSWER: **adiabatic**

[10] The adiabatic expansion phase of the Carnot cycle is preceded by an expansion phase that holds this quantity constant. This quantity is measured on the Fahrenheit, Celsius, or Kelvin scales.

ANSWER: **temperature** [prompt on T] <HK>

12. This man proposed the “one country, two systems” policy, allowing Macau and Hong Kong to maintain capitalistic economies. For 10 points each:

[10] Name this “paramount leader” who claimed that “it doesn't matter if the cat is black or white, as long as it catches the mice,” in reference to his economic policy. He implemented Zhou Enlai's Four Modernizations program.

ANSWER: **Deng** Xiaoping

[10] During his rule, Deng sent troops to quell protests at this location in Beijing, where they massacred close to 1,000 civilians. The photograph “Tank Man” depicts a man near this location.

ANSWER: **Tiananmen** Square

[10] Protestors initially flooded Tiananmen Square to advocate for the legacy of this official, who died of a heart attack in 1989 after being forced out as General Secretary of the Communist Party.

ANSWER: **Hu** Yaobang <MK>

13. Answer some questions about the 17th-century nun, scholar, and writer Sor Juana Inés de la Cruz, for 10 points each:

[10] Sor Juana wrote a long *silva* named after one of these phenomena. About half a century earlier, Pedro Calderón de la Barca wrote a play about Segismundo, in which one of these phenomena is the *second* title noun.

ANSWER: **dream** [or *Life is a Dream*, or *First Dream*]

[10] This other writer and poet wrote about Sor Juana in his biography *The Traps of Faith*. He included the essay “The Day of the Dead” in a collection about his country’s history and identity.

ANSWER: Octavio **Paz**

[10] Sor Juana and Paz were both from this country. Paz wrote his essay “The Sons of La Malinche” about this country, where Sor Juana lived during its colonial period as the Viceroyalty of New Spain.

ANSWER: **Mexico** <MGS>

14. This battle largely enabled the Declaration of Arbroath, which was issued six years later. For 10 points each:

[10] Name this battle where Robert the Bruce prevented Edward II from relieving the siege of Stirling Castle.

During a duel at this battle, Robert the Bruce split Henry de Bohun’s head with an axe.

ANSWER: Battle of **Bannockburn**

[10] The Declaration of Arbroath proclaimed the independence of this country to the north of England. Much later, Elizabeth I commanded the execution of her cousin, Mary Stuart, who was queen of this country.

ANSWER: **Scotland**

[10] This rebel began the fight for Scottish independence. He won at Stirling Bridge with Andrew Moray but was defeated the following year at Falkirk.

ANSWER: William **Wallace** <MK>

15. The pioneering experiments studying this phenomenon involved convincing animals they couldn’t escape electric shocks. For 10 points each:

[10] Name this condition studied by the positivist Martin Seligman. Those affected by this condition choose not to move away from a negative stimulus even when they can.

ANSWER: **learned helplessness**

[10] Seligman studied learned helplessness using this process, which involves presenting two stimuli, one neutral and one biologically potent, in close succession. Little Albert was made to fear furry white objects via this process.

ANSWER: **classical conditioning** [or **respondent conditioning**, or **Pavlovian conditioning**, prompt on partial answer, but do NOT accept “operant conditioning”]

[10] Ivan Pavlov and Martin Seligman used these animals to study classical conditioning and learned helplessness, respectively. Pavlov classically conditioned some of these animals to salivate at the sound of a bell.

ANSWER: **dogs** <HK>

16. Changes in this quantity are distributed uniformly throughout a fluid according to Pascal’s principle. For 10 points each:

[10] Name this quantity that is, appropriately enough, measured in pascals. Other units for this measure of force per unit area include millimeters of mercury and atmospheres.

ANSWER: **pressure** [prompt on **P**]

[10] Fluid flowing in a pipe experiences a pressure drop proportional to flow rate and inversely proportional to the square of this quantity for the pipe. Resistance varies inversely with a resistor’s value for this quantity.

ANSWER: **cross-sectional area** [or **cross-section**; prompt on **area**]

[10] Poiseuille’s [PWA-zoo-ee’s] law for pressure drop holds only in the case of laminar flow at low values of the Reynolds number. At large Reynolds numbers, laminar flow is replaced by this more complex regime.

ANSWER: **turbulence** [or **turbulent** flow] <SE>

17. Answer the following about conceptual music, which is typically not actually performed or listened to. For 10 points each:

[10] Perhaps the most famous such piece is *this* work by John Cage, which consists of the ambient noise of a concert hall while a performer or group does *not* play for the title amount of time.

ANSWER: **4'33"** ["four thirty-three"]

[10] This piece by the composer of *Three Pieces in the Shape of a Pear* consists of a very slow, dissonant theme played 840 times in succession.

ANSWER: **Vexations**

[10] Erik Satie's *Vexations* makes extensive use of enharmonic notation, often using a sharp to represent a note that would more typically be written using *this* symbol, which lowers the pitch of a note by one half-step.

ANSWER: **flats** <JW>

18. Answer some questions about boxplots. For 10 points each:

[10] The line bisecting the namesake box in a boxplot represents this value for the dataset. Unlike the mean, this value for a dataset is not skewed by outliers as it represents the middle value of the distribution.

ANSWER: **median**

[10] The length of the box in a boxplot represents this value of the distribution. The value of this measure of statistical dispersion is equal to the difference between the 75th and 25th percentiles.

ANSWER: **interquartile range** [or **IQR**; or **midspread**; or **H-spread**]

[10] This constant is multiplied by the IQR to calculate the length of the whiskers on either side of a boxplot. Values beyond the IQR times this constant added to the third quartile or subtracted from the first quartile are outliers.

ANSWER: **1.5** [accept **3/2**] <BY>

19. The *Oxford English Dictionary* defines *ekphrasis* [ek-frei-suhs] as "the use of detailed description of a work of visual art as a literary device." Name some American writers of ekphrastic poems, for 10 points each:

[10] This poet of "September 1, 1939" wrote "about suffering they were never wrong, / the old Masters" before turning to an ekphrastic description of Brueghel's *Landscape with the Fall of Icarus* in "Musée des Beaux-Arts."

ANSWER: W(ystan) H(ugh) **Auden**

[10] The lines "according to Brueghel / when Icarus fell / it was spring" begin this poet's "Landscape with the Fall of Icarus"; in another poem, he said "so much depends upon" an object "glazed with rain water."

ANSWER: William Carlos **Williams** (the second poem is "The Red Wheelbarrow")

[10] This poet wrote an ekphrastic description of the painting *L'Estaque* entitled "Cézanne's Ports." He also described an encounter with Walt Whitman in "A Supermarket in California."

ANSWER: (Irwin) Allen **Ginsberg** <JW>

20. This country coordinated the "Green March" in an attempt to obtain a disputed province. For 10 points each:

[10] Name this country, whose namesake "question" was addressed by European powers during the Algeciras Conference. The deployment of the gunboat SMS *Panther* to this country sparked a diplomatic dispute.

ANSWER: Kingdom of **Morocco**

[10] This European colonial power fought the Rif War against Moroccan guerilla forces under Abd el-Krim. Francisco Franco was one of this country's generals during the war.

ANSWER: Kingdom of **Spain**

[10] In 2007, this Spanish king sparked protests in Morocco by visiting the exclaves of Ceuta and Melilla. This king, who assumed the throne after Franco's death, abdicated in 2014.

ANSWER: King **Juan Carlos I** <MK>

Tiebreaker

Cyclized versions of some of these molecules anomerize under acidic conditions. For 10 points each:

[10] Name these molecules which have a general formula of CH_2O . Examples of these molecules include glucose and fructose.

ANSWER: **carbohydrates** [or **sugars**; prompt on **saccharides**]

[10] The anomeric carbons in cyclic carbohydrates are stereocenters, as are most of the other carbons. Molecules with stereocenters often have this property, indicating that their mirror images are not superimposable.

ANSWER: **chirality**

[10] *Two answers required.* A right hand rule, *unrelated* to the one used to determine the direction of a vector, can be used to assign chiral centers with one of these *two* letters as per the Cahn–Ingold–Prelog rules.

ANSWER: **R** and **S** [accept in either order] <HK>