

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

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Packet 2 Tossups

1. **In nonlinear optics, spontaneous parametric down-conversion increases the number of photons in a beam by this factor. All operators on quantum systems with this many states can be expressed as sums of Pauli matrices. This is the *minimum* number of photons produced in each antimatter annihilation reaction. In superconductors, this many (*) electrons condense into a quasiparticle named for Leon Cooper. The physics of this many gravitating bodies is described by the Kepler problem, which has general closed-form solutions, unlike the case with one body more. For 10 points, every magnet has how many poles?**

ANSWER: **two** <SE>

2. **A group attacking this city included a man who was swallowed up by the earth along with his charioteer, Baton [BAT-in], and a man who ate the brains of his opponent Melannipus. Those opponents of this city were Am-phi-ar-aüs and Tydeus, respectively. After their fathers led by Adrastus failed to do so, the Epigoni sacked this city. This city's troubles began after a (*) Corinthian won its queen by answering "man" to a mysterious question. After Polynices died while attacking this city, Creon forbade Antigone from burying him. "Seven" Argive warriors fought "against"—for 10 points—what Greek city, which Oedipus ruled and Cadmus founded?**

ANSWER: **Thebes** <MK>

3. **A con man created by this author preaches on Bar Beach in a play titled for his *Trials* and conspires to beat Shadrack in an election in a play titled for his *Metamorphosis*; that character is Brother Jero. In another work by this author, Iyaloja marries her son's fiancée to the protagonist, who had earlier bantered with the Praise Singer about seeing the (*) "Not-I" bird. This man wrote about Simon Pilkings's failed attempt to prevent a Yoruba ritual, resulting in Olunde's death. For 10 points, identify this Nigerian author, who wrote about Elesin's suicide in *Death and the King's Horseman*.**

ANSWER: Wole **Soyinka** <SL>

4. **A sculpture by Pablo Picasso depicting a fish appears in this city's largest park, the Vondelpark. This city is served by the Schiphol International Airport, and its tourist attractions include the Concertgebouw and the Heineken Beer Factory. The term Grachtengordel refers to the concentric rings of (*) canals that encircle this city, which is also home to the Van Gogh Museum. This capital city is famous for its red-light district of De Wallen and for its many "coffeeshops," in which patrons may legally consume cannabis. Rembrandt's *The Night Watch* is housed in this city's Rijksmuseum. For 10 points, name this capital of the Netherlands.**

ANSWER: **Amsterdam** <JW>

5. **One of these people supposedly got his name because he could drink an entire beaker of beer in one gulp; that man, Klaus Störtebeker, led the Likedeelers, a group of these people who emerged from the Victual Brothers. The second *lex Gabinia* gave Pompey power to attack these people, many of whom were based in Cilicia. In the 17th century, (*) Tortuga was a center of these people. Members of this profession included Edward Teach and Anne Bonny. Thomas Jefferson refused to pay tribute to members of this profession who haunted the Barbary Coast. For 10 points, name this profession whose members steal from ships at sea.**

ANSWER: pirates [or buccaneers; or corsairs; accept privateers] <MK>

6. **This figure is represented in a faceless limestone sculpture whose head is covered with horizontal bands that may be braided hair. A semi-nude woman reclines on a couch in another sculpture titled for this figure, which was modeled after Pauline Borghese and sculpted by Antonio Canova. This figure was depicted nude and clutching drapery as she prepares for a bath in a Praxiteles sculpture. At (*) Willendorf, figurines named for this goddess were unearthed; those figurines are distinguished by their large breasts. A sculpture of this deity may have held an apple but is now missing both arms. For 10 points, identify this Greco-Roman goddess of love, who titles a sculpture “de Milo.”**

ANSWER: Venus [or Aphrodite] <SL>

7. **The most abundant of these entities in the human genome are derived from the 7SL RNA and are called Alu elements. Alu elements are classified as SINEs, which along with LINEs are common versions of these entities. Gypsy and the P element found in *Drosophila* are examples of these entities. The first synthetic one of these was based on the (*) Tc1/Mariner-like elements found in animals and named Sleeping Beauty. Class I varieties of these entities prefixed “retro” encode their own reverse transcriptase, enabling them to insert themselves at new loci. For 10 points, Barbara McClintock first identified what “jumping genes” responsible for coloration patterns in maize?**

ANSWER: transposons [accept transposable elements or retrotransposons; prompt on LINE elements before “LINEs,” SINE elements before “SINEs,” or jumping genes before “jumping genes”] <HK>

8. **In *Dark Souls II*, the player fights a large version of this enemy called the “Duke’s Dear Freja.” Mimi, from *Super Paper Mario*, turns into this animal during boss fights. In *Ocarina of Time*, collecting one-hundred of these animals lifts a curse on a family. In *Undertale*, these animals sell (*) baked goods and later fight with their leader, Muffet. The electric-type Pokémon Joltik resembles one of these animals. The *League of Legends* champion Elise changes from “Human Form” into one of these animals. *Minecraft*’s skeletons can ride—for 10 points—what animal that drops string and can be found near cobwebs?**

ANSWER: spiders [accept arachnids] <MGS>

9. **In one film by this director, a failed assault on the Anthill leads to the execution of three men despite Colonel Dax’s defense of them. In another of his films, a character repeatedly types the phrase “All work and no play makes John a dull boy.” In a film by this director of *Paths of Glory*, each member of a group of slaves proclaims “I am” the title character, (*) *Spartacus*. Another film by this director features the word “REDRUM” scrawled in lipstick on a mirror and climaxes with Jack Nicholson breaking through a door and screaming, “Here’s Johnny!” For 10 points, what director of *The Shining* depicted the sentient computer HAL 9000 in his film *2001: A Space Odyssey*?**

ANSWER: Stanley Kubrick <JW>

10. A “geometrical” subfield of the field governed by this statement is based on Caratheodory’s purely axiomatic statement of this principle. Time reversal symmetry is at odds with this statement, as described by Loschmidt’s paradox. This law can be expressed by an inequality which states that the line integral of dQ over T must be (*) less than or equal to zero. Heat cannot spontaneously move from a cold body to a hot sink according to this law’s Clausius statement, and its Kelvin statement says that heat cannot be converted directly into work. Maxwell’s demon would violate—for 10 points—what law that states that the entropy of a closed system cannot decrease over time?

ANSWER: second law of thermodynamics [prompt on partial answer] <HK>

11. A ruler based at this city sent Charlemagne’s court a number of gifts, including a clock from which twelve horsemen emerged hourly. An intellectual institution in this city undertook the “Translation Movement,” saving many ancient texts. To avoid a taboo which prevented *spilling* royal blood, besiegers of this city rolled up a ruler in a carpet and trampled him with horses. The developer of algebra, (*) al-Khwarizmi, worked in this city. In 1258, Hulagu Khan led a Mongol sack of this city, destroying the House of Wisdom. For 10 points, what capital of the Abbasid caliphate is now the capital of Iraq?

ANSWER: Baghdad <MK>

12. An organization that opposes this practice is represented by a red sash and includes members such as Julia in George Orwell’s *1984*. In a short story by Guy de Maupassant, a group of travelers compels the title character to perform this action with a Prussian officer; that story is “Boule de Suif.” In *The Unbearable Lightness of Being*, Sabina often wears a (*) bowler hat while she and Tomas perform this action. The women of Athens refuse to engage in this activity unless their husbands end the Peloponnesian War in Aristophanes’ *Lysistrata*. For 10 points, identify this process that can sometimes lead to conception.

ANSWER: sex [or sexual intercourse; accept making love and other synonyms] <JW>

13. It’s not Sepúlveda, but this philosopher wrote a political treatise in which he infamously asserts that some people are born to be slaves. This philosopher believed that happiness is an “activity” carried out in accordance with virtue. To solve the problem of infinite regression, this philosopher posited a being engaged in perpetual self-contemplation, the (*) “unmoved mover.” This author discussed virtue in the context of his “doctrine of the mean” and advocated the pursuit of *eudaimonia*. For 10 points, name this Greek philosopher of the *Metaphysics* and the *Nicomachean Ethics* who tutored Alexander the Great.

ANSWER: Aristotle <VS>

14. Union forces won the Battle of Jonesborough in this state. An observer saw General George H. Thomas “standing like a rock” during a battle in this state, where a telegraph reported that a city was “ours, and fairly won.” Henry Wirz was executed for his administration of the prisoner-of-war camp (*) Andersonville in this state, which was the site of the Battle of Chickamauga. In this state, soldiers wrapped railroad rails around trees in a general’s namesake “neckties.” The scorched-earth “March to the Sea” campaign devastated this state. For 10 points, name this state where William Tecumseh Sherman captured Savannah and destroyed Atlanta.

ANSWER: Georgia <MK>

15. Coleridge disputed Milton's claim that this animal is "most melancholy" in a poem named for this creature, subtitled "A Conversation Poem." In another poem, the author is brought back to his senses by the word "forlorn," after he imagines accompanying this animal "not charioted by Bacchus and his pards, / but on the viewless wings of Poesy." Because of a story from Greek mythology, the name (*) "Philomel" has become synonymous with this bird. A poem that says this bird "wast not born for death" begins with the phrase "my heart aches." The question "do I wake or sleep?" concludes—for 10 points—an "Ode" to what bird, written by John Keats?

ANSWER: nightingale <JW>

16. He's not Albéniz, but this composer wrote an orchestral triptych that includes the three-movement piece *Ibéria*. This composer never wrote a successor to his "first rhapsody" for clarinet and piano. Like Holst, this composer included a wordless women's chorus in "Sirens," the third of his three *Nocturnes*. This composer of four works titled *Images* wrote two books of (*) *Preludes*, including "The Sunken Cathedral." This composer of *Two Arabesques* wrote piano pieces like *Children's Corner* and *Suite bergamasque*. *Prelude to the Afternoon of a Faun* was written by—for 10 points—what French composer of "Clair de Lune"?

ANSWER: (Achille)-Claude Debussy <JW>

17. The square of this function of x is equal to "one-half plus one-half times this function of $2x$." This function of x is the real part of the complex number e to the ix , where i is the square-root of -1 . Unlike a similarly-named function, this function of x equals this function of $-x$ and its value at 0 is (*) 1. This function's namesake law can be used to find the length of any side of an arbitrary triangle, and contains an expression commonly written as $a^2 + b^2 - 2ab$ times this function of C . For 10 points, name this function, found by dividing the length of the adjacent leg of a right triangle by its hypotenuse, in contrast to the sine function.

ANSWER: cosine <JW>

18. This woman engages in a levirate-like marriage after Ploni Almoni forfeits a sandal, renouncing his own right to marry her. After the death of Mahlon, this woman uncovers the feet of a man sleeping on a threshing floor and rests next to him. This woman leaves Orpah behind in her homeland. Through her son Obed, this woman joins Tamar, Rahab, Bathsheba, and (*) Mary in Matthew's genealogy of Jesus. After declaring "your people shall be my people, your God my God," this woman supports her mother-in-law Naomi by gleaning barley. Boaz ultimately married—for 10 points—what faithful Moabite woman of the Old Testament?

ANSWER: Ruth <AY>

19. A man named Tarp gives a leg iron to the protagonist of this novel, who is repeatedly forgiven for not paying his rent by Mary Rambo. For taking Mr. Norton to the Golden Day and letting him speak with Jim Trueblood, the protagonist of this novel is kicked out of a college run by Dr. (*) Bledsoe. The narrator of this novel, who now lives in an underground room lit by hundreds of electric lights, gets a job with Liberty Paints and is compelled to take part in a humiliating "battle royal." Ras the Destroyer incites a riot at the end of—for 10 points—what novel with an unnamed black narrator, by Ralph Ellison?

ANSWER: Invisible Man [do not accept or prompt on "The Invisible Man"] <JW>

20. A politician from this region gained prominence after editing a book on its 1949 "Asbestos Strike." That politician from this region claimed to have only said "fuddle duddle" when he was accused of cursing in Parliament. The Meech Lake Accords were proposed to gain this region's support for constitutional changes. In the 1960s, this region underwent the (*) Quiet Revolution. A city in this region hosted the 1967 World's Fair. The War Measures Act was invoked after a group promoting this province's separatism kidnapped James Cross and Pierre Laporte. Pierre Trudeau was from—for 10 points—what French-speaking Canadian province?

ANSWER: Québec <MK>

Tiebreaker

In one poem, this poet wrote the satiric line “ale, man, ale’s the stuff to drink / for fellows whom it hurts to think.” In another poem, this poet advises to “hold to the low lintel up / the still defended challenge-cup.” He included the lines “malt does more than Milton can / to justify God’s ways to man” in a poem that tells the title character (*) “you eat your victuals [vittles] fast enough.” This poet began a poem with the lines “the time you won your town the race / we chaired you through the market-place.” The poems “To An Athlete Dying Young” and “Terence, this is stupid stuff” are included in—for 10 points—what English poet’s collection *A Shropshire Lad*?
ANSWER: A(lfred) E(dward) **Housman** <MK>

Bonuses

1. Mummified crocodile eggs were sometimes offered to this god at his sanctuary of Crocodilopolis. For 10 points each:

[10] Name this Egyptian fertility god, who bore epithets like “he who eats while he mates.” This god retrieved Horus’ hands after Isis cut them off.

ANSWER: **Sobek** [or **Sochet**]

[10] As a god of fertility, Sobek was closely associated with this Egyptian river. The god Hapi symbolized the annual flooding of this river.

ANSWER: **Nile** River

[10] The Book of Faiyum, told from Sobek’s point of view, syncretizes him with this other deity. In his typical form, this god repeatedly fought against the monster Apep.

ANSWER: Sobek-**Ra** [or **Re**] <AY>

2. This director’s film *The Magnificent Ambersons* adapted a novel by Booth Tarkington. For 10 points each:

[10] Name this filmmaker, who also directed *The Lady from Shanghai* and a film where the protagonist has an affair with the opera singer Susan Alexander.

ANSWER: Orson **Welles**

[10] The opera singer Susan Alexander appears in this Welles film, which follows the rise and fall of a newspaper tycoon. At the beginning of this film, a man drops a snow globe and dies after whispering the word “Rosebud.”

ANSWER: **Citizen Kane**

[10] Welles’s last Hollywood film was this 1958 noir thriller. It follows Hank Quinlan, a corrupt cop in a border town, and begins with a legendary three-minute-long tracking shot following a bomb placed in a car.

ANSWER: **Touch of Evil** <BCE>

3. This class is subdivided into orders Caudata, Anura, and Gymnophiona. For 10 points each:

[10] Name this endangered class, extinct varieties of which include the 30-foot-long *Prionosuchus*, whose snout resembles the unrelated gharial and gar. Members of this class possess an unusual three-chambered heart.

ANSWER: **amphibians**

[10] The rapid decline of amphibians is due in large part to chytridiomycosis, which is caused by one of these organisms. Other varieties of these organisms include *Candida albicans*, which is responsible for yeast infections.

ANSWER: **fungi** [or **fungus**]

[10] A fungus called Tropical Race 4 is responsible for the current crisis in the production of this food. That fungus’ predecessor annihilated large scale production of the now-obsolete Gros Michel variety of this foodstuff.

ANSWER: **bananas** <HK>

4. Solon offended a ruler of this kingdom by telling him that Tellus the Athenian was the happiest man in the world. For 10 points each:

[10] Name this Anatolian kingdom, the first state to use coins. A ruler of this kingdom, Croesus, learned that he would destroy a great empire by attacking Persia; doing so, he lost at Thymbra, destroying his own great empire.

ANSWER: Croesus of **Lydia**

[10] This author tells the stories of Solon and Croesus in his *Histories*. This man is often called the “Father of History.”

ANSWER: **Herodotus** [accept, but do not otherwise reveal, **Herodotus** of **Halicarnassus**]

[10] Herodotus was born in this city in Asia Minor. In this city, Artemisia II built a massive “Mausoleum” that was considered one of the Seven Wonders of the Ancient World.

ANSWER: Mausoleum of **Halicarnassus** <MK>

5. Answer the following about animals in the works of Edgar Allan Poe, for 10 points each:

[10] This animal is described as “sagacious to an astonishing degree.” A narrator gouges this animal’s eye out with a penknife and kills his wife when he cannot destroy this animal.

ANSWER: “The **Black Cat**” [accept **Pluto**]

[10] The speaker of a poem by Poe asks this title bird to “Take thy beak from out my heart, and take thy form from off my door!”, but “Quoth [this animal] ‘Nevermore.’”

ANSWER: “The **Raven**”

[10] This short story’s title animal bites William Legrand, who deciphers a cryptogram leading to the buried treasure of Captain Kidd. The title animal of this short story is a large, shiny insect.

ANSWER: “The **Gold-Bug**” <MGS>

6. Answer some questions about the typical layout of Roman Catholic churches, for 10 points each:

[10] In Roman Catholicism, priests conduct the majority of services from behind this structure, which must contain a relic of a saint. The bread and wine are consecrated on this structure during the Eucharistic rite.

ANSWER: **altar**

[10] The congregation sits in this central part of a Roman Catholic church, which is flanked on either side by aisles. Traditionally, its upkeep was the responsibility of the parishioners.

ANSWER: **nave**

[10] Some Roman Catholic churches feature special “lofts” from which this ensemble sings liturgies and hymns during services.

ANSWER: church **choir** [or **chorus**; or reasonable equivalents] <MK>

7. Optics experiments are often carried out on air tables to isolate their delicate components from vibrations. Answer the following about the physics of air tables, for 10 points each.

[10] Though the table is separated from vibrations on the ground by a column of air in each leg, the displaced air still exerts a force given by this law. For a spring, this law states that “ F equals negative k times x .”

ANSWER: **Hooke**’s law

[10] The table’s legs will transmit only a small fraction of outside vibrations as long as their frequency is far above the characteristic frequency of this phenomenon, in which driven vibrations of the table grow without bound.

ANSWER: **resonance** [accept **resonant** frequency]

[10] Suppose the air column in each table leg has mass M , cross-sectional area A , and height h . Of the quantities M , A , h , and the acceleration due to gravity, g , which *two* quantities should appear in the formula for the table’s resonant frequency?

ANSWER: **g** and **h** [accept in either order; accept **square root of g over h** ; accept acceleration due to **gravity** and **height**] <SE>

8. This process can be modeled by a function named for Cobb and Douglas, For 10 points each:

[10] Give the name for the process that takes one or more inputs to create a consumable output.

ANSWER: **production** [accept word forms]

[10] The L in the Cobb-Douglas function represents this common input to production. Suppliers of this input, or workers, can be represented by unions.

ANSWER: **labor**

[10] The exponents in the Cobb-Douglas Function represent this value for labor and capital. This quantity represents how responsive output is to changes in the inputs.

ANSWER: output **elasticity** <BY>

9. According to legend, a commander at this location yelled “come out you old Rat!” to William Delaplace. For 10 points each:

[10] Name this location on Lake Champlain that was seized by Ethan Allen’s Green Mountain Boys during the American Revolution.

ANSWER: Fort **Ticonderoga**

[10] After the capture of Fort Ticonderoga, American forces transported these weapons to Boston in the “noble train of artillery.” The range of these weapons was affected by the amount of powder used by their crews.

ANSWER: **cannons** [accept **mortars**; accept **howitzers**]

[10] This man led the “noble train of artillery” from Fort Ticonderoga to Boston. This man founded the Society of the Cincinnati.

ANSWER: Henry **Knox** <MK>

10. An author from this country wrote the novel *The Wreath*, in which the protagonist falls in love with the heir to Husaby after being sent to a Benedictine nunnery. For 10 points each:

[10] Identify this country. Another author from this country wrote the novel *Hunger*, in which the protagonist meets a woman named “Ylajali.”

ANSWER: **Norway**

[10] In this play by a Norwegian author, the character Gregers claims his destiny is to “be the thirteenth at the table.” In this play, Hedvig shoots herself in her family’s loft.

ANSWER: *The Wild Duck*

[10] This Norwegian author wrote the play *The Wild Duck*. He also wrote *Hedda Gabler*, *An Enemy of the People*, and *A Doll’s House*.

ANSWER: Henrik (Johan) **Ibsen** <SL>

11. Outside of Tibet, this is the largest and highest plateau in the world. For 10 points each:

[10] Name this area where the Andes are at their widest, a high plateau whose extremes contain parts of Peru, Chile, and Argentina. This region contains Lake Titicaca and is known for its mining and llama and vicuña herding.

ANSWER: **Altiplano** [or **Collao**]

[10] The bulk of the Altiplano is contained within the borders of this landlocked South American country. This country’s two capitals are La Paz and Sucre, and it is home to the Aymara people.

ANSWER: **Bolivia**

[10] Bolivia’s Altiplano is home to the Salar de Uyuni, the world’s largest “flat” covered in this substance. Both the Salar’s clear skies and its overlying layer of this substance make it ideal for calibrating satellites.

ANSWER: **salt** <HK>

12. For 10 points each—answer the following about roses and music:

[10] Robert Schumann wrote songs like “With Myrtles and Roses” and “The Roses, the Lilies” after becoming engaged to *this* virtuoso pianist and composer, who pioneered the modern piano recital by playing from memory.

ANSWER: **Clara Wieck** [accept either name; accept **Clara** Schumann]

[10] In Richard Strauss’ *Der Rosenkavalier*, the teenager Octavian presents the title silver rose to Sophie with the help of *this* older woman. The opera controversially begins with Octavian and this woman in bed together.

ANSWER: **Marschallin** [accept Princess **Marie Therese** von Werdenberg]

[10] *Johann* Strauss Junior drew from his operetta *The Queen’s Lace Handkerchief* to write a piece in *this* genre called *Roses of the South*. Strauss is often called the “king” of this ballroom dance’s Viennese variety.

ANSWER: **waltzes** [or **Walzer**] <AY>

13. The technique of Gaussian elimination can be used to perform a variety of operations on these objects, including computing their rank and inverting them. For 10 points each:

[10] Name these mathematical objects that consist of a series of numbers placed in a rectangular array. In linear algebra, these objects represent linear maps and are used alongside vectors.

ANSWER: **matrix** [or **matrices**]

[10] Once Gaussian elimination is complete, the matrix has been transformed into this form. In this form, each row has a leading coefficient, or pivot element, which must lie to the right of the previous row's leading coefficient.

ANSWER: **row echelon** form [accept **reduced row echelon** form]

[10] For a matrix to have an inverse, this value must be nonzero. Cofactor expansion can be used to find this value, which is often expressed by the formula ad minus bc for a 2-by-2 matrix.

ANSWER: **determinant** <BY>

14. This character tells her father "I love your Majesty / according to my bond; no more nor less." For 10 points each: [10] Name this younger sister of Goneril and Regan. Unlike her sisters, she refuses to flatter her father in order to receive a share of his realm, leading to her disinheritance.

ANSWER: **Cordelia**

[10] When Cordelia's father asks her "what can you say to draw / a third more opulent than your sisters?", she simply answers with this word, which causes her father to become extremely angry.

ANSWER: "**Nothing**, my lord."

[10] Cordelia features in this Shakespeare play, in which she is the daughter of the title monarch. Both Cordelia and this play's title character meet a gruesome end at its conclusion.

ANSWER: **King Lear** <MGS>

15. In this country, King Victor Emmanuel III reinstated the office of Prime Minister after ousting Benito Mussolini. For 10 points each:

[10] Name this country whose current Prime Minister, Giuseppe Conte, leads a populist coalition of the Five Star Movement and the League.

ANSWER: **Italy** [or **Italian Republic**; or **Repubblica italiana**]

[10] This Prime Minister of Italy arranged the "historic compromise," where the Italian Communist Party supported the Christian Democracy Party. As a result of the compromise, the Red Brigades kidnapped and killed this man.

ANSWER: Aldo **Moro**

[10] This Prime Minister of Italy threw infamous "bunga bunga" parties while in office. This man founded the broadcasting group Mediaset.

ANSWER: Silvio **Berlusconi** <MK>

16. Answer some questions about the odd animals that NHL fans sometimes throw onto the ice. For 10 points each:

[10] In 1995, this team's forward Scott Mellanby killed a rat in the locker room, then scored two goals in that night's game to complete a "rat trick." This team's fans thus sporadically throw plastic rats onto the ice of its BB&T Center.

ANSWER: **Florida Panthers** [accept either underlined portion]

[10] Fans of the Nashville Predators threw catfish onto the ice during the 2017 Stanley Cup Finals, which the Predators lost to this team. This team's players include Evgeni Malkin.

ANSWER: **Pittsburgh Penguins** [accept either underlined portion]

[10] In 1952, fans of the Detroit Red Wings threw one of these animals onto the ice, reasoning that its eight arms represented the eight playoff wins that a team needed to win a Stanley Cup at the time.

ANSWER: **octopuses** <VS>

17. In this painting, some discarded red robes and a pair of red slippers to the right of the action provide the only bright color. For 10 points each:

[10] Name this painting, in which the central scantily-clad woman gazes at the viewer in an apparent plea for help. One man pulls at her garments and another looks on, smiling.

ANSWER: ***Susanna and the Elders***

[10] This Dutch Golden Age painter of *Susanna and the Elders* is more famous for depicting a girl with a chicken in her belt amidst a shooting company in *The Night Watch*.

ANSWER: **Rembrandt** van Rijn

[10] This Renaissance artist painted several versions of *Susanna and the Elders*. She placed the face of her rapist on a severed head in *Judith Slaying Holofernes*.

ANSWER: Artemisia **Gentileschi** <JW>

18. According to legend, this dynasty's final emperor created a wine-filled lake with a "meat forest" on its central island. For 10 points each:

[10] Name this dynasty, China's earliest to be attested by archaeological evidence. It succeeded a dynasty founded by Yu the Great.

ANSWER: **Shang** dynasty [accept **Yin** dynasty]

[10] The fall of this other Chinese dynasty led to the beginning of the Three Kingdoms period. This dynasty shares its name with the predominant ethnic group in modern China.

ANSWER: **Han** dynasty

[10] The only ruler of this Chinese dynasty, which is more properly considered an interregnum period in the history of the Han dynasty, was Wang Mang. This "dynasty" ruled from 9 to 23 A.D.

ANSWER: **Xin** dynasty <MK>

19. Density is defined as mass divided by this quantity, and molarity can be found by dividing moles by this quantity. For 10 points each:

[10] Name this quantity often measured in cubic meters or liters.

ANSWER: **volume**

[10] This theory of the behavior of gases neglects the volume of gas molecules in its calculations. Its other assumptions include perfectly elastic collisions between gas molecules and a lack of intermolecular interactions.

ANSWER: **kinetic** theory of gases [or **kinetic** molecular theory; or **KMT**]

[10] *Two answers required.* In their Dutch namesake's equation of state which corrects the ideal gas law, these *two* constants account for the attractive and repulsive intermolecular interactions neglected by kinetic molecular theory.

ANSWER: the van der Waals **a** and **b** constants [prompt on van der Waals constants or van der Waals coefficients] <MP/HK>

20. This novel's protagonist, Amir, writes a story about a man who kills his wife to cry pearl tears. For 10 points each:

[10] Name this novel in which Amir fails to save his half-brother Hassan from being raped, frames him for a crime, and then moves to America. This novel by Khaled Hosseini is titled for Hassan's role in a certain sport.

ANSWER: ***The Kite Runner***

[10] In *The Kite Runner*, Amir's father argues that no matter what the mullahs teach, *this* is the only sin, and that all other sins can be condensed into this one. Amir falsely accuses Hassan of having committed this crime.

ANSWER: **theft** [accept equivalents like **robbery** or **stealing**]

[10] *The Kite Runner* is set in this home country of Hosseini, where he also set other novels like *A Thousand Splendid Suns*. Hassan takes part in kite fights in this country's capital of Kabul.

ANSWER: **Afghanistan** <HK>

Tiebreaker

According to Noether's [NEUH-tur'z] theorem, the insensitivity of physical laws to position in space leads to the conservation of this quantity. For 10 points each:

[10] Name this conserved vector quantity that, for a single object in motion, equals its mass times its velocity.

ANSWER: **momentum** [accept linear **momentum**; do not accept or prompt on "angular momentum"]

[10] When a system's momentum is conserved, this point will move in a straight line at constant velocity.

Free-falling bodies move as if gravity acts directly on this point.

ANSWER: **center of mass** [accept **centroid**; prompt on COM; prompt on center of gravity]

[10] Changing from your reference frame to the center of mass frame of an object moving at constant velocity requires one of these transformations between inertial observers. They are named for an Italian scholar of inertia.

ANSWER: **Galilean** transformations <SE>