

2020 Reinstein Set – Packet 11

Tossups

1. There has been controversy over whether a museum should be named after Heidi Weber or this architect, who designed the museum. This architect designed the Sanskar Kendra, a city museum in **Ahmedabad** [UH-muh-dah-bahd], India. That work, considered the first modernist building in India, was nicknamed by this person the Museum of Knowledge. Ribbon windows and roof terraces are among this architect's five points of modern architecture, which also include putting buildings on **pilotis** [pee-LOH-teez] to lift them above ground. The five points are used in this architect's Villa **Savoye** [sahv-wah]. Name this Swiss-French architect.

Answer: **Le Corbusier** [leh kor-boo-see-yay] [or Charles-Édouard **Jeanneret**]

2. Pappus's area theorem uses extensions of sides from two of these shapes to create a third shape of this type whose area equals the sum of the first two areas. A shear mapping changes a rectangle into one of these shapes. A quadrilateral is one of these shapes if and only if its diagonals bisect each other. The area of one of these shapes equals the product of two adjacent sides times the sine of the angle between them. If all sides of this shape are congruent, then it is a rhombus. In this shape, any two adjacent angles are supplementary. Name this quadrilateral whose opposite sides are parallel.

Answer: **parallelogram**

3. A musical about this character contains the song "Rise Above". The Sinister Syndicate that has opposed this character includes Boomerang and Hardshell; this character has also been opposed by the Sinister Six. Many of the criticisms of this character are amplified by J. Jonah Jameson Jr., who is the editor-in-chief of the *Daily Bugle*. This character is raised by Aunt May and Uncle Ben after his parents die, and his real name is Peter Parker. Name this Stan Lee superhero who stops Doctor Octopus and Green Goblin and who gained superpowers after being bitten by an arachnid.

Answer: **Spider-Man** [accept **Peter** Parker or Peter **Parker** before "Peter"]

4. A short-lived country named for this river was started and ended by Antonio Canales [kuh-NAH-“lace”] in 1840 and led by Jesús de Cárdenas [hay-ZOOSS day KAR-day-nahss]. A shift in the path of this river caused the Chamizal [chah-MEE-zahl] dispute, which led to an assassination attempt against President Taft. The Tiguex [TEE-wish] War took place when Francisco Vázquez de Coronado attacked Native Americans near this river. The United States fought a war over the territory between this river and the Nueces [noo-“ACE-ace”] River. Name this river that, according to the Treaty of Guadalupe Hidalgo [ee-DAHL-goh], forms part of the border between the U.S. and Mexico.

Answer: **Rio Grande** (del Norte) [or Río **Bravo** (del Norte)]

5. The log of vapor pressure is related to this quantity in the Antoine [ant-wahn] equation. According to the Stefan [STEFF-un]-Boltzmann law, radiant emittance is proportional to the fourth power of this quantity. In a Carnot [kar-noh] cycle, two steps have constant heat, and this quantity is constant in the two other steps. The change in energy in a system equals the heat capacity times the change in this quantity. Gibbs free energy equals enthalpy minus entropy times this quantity. In the ideal gas equation, this quantity is multiplied by the number of moles and the gas constant. Name this quantity that can be measured in kelvins.

Answer: (absolute) **temperature**

6. One poem by this writer states “Toil conquered all, remorseless toil” and “Before all, worship the Gods.” That poem, which is influenced by this poet’s contemporary Varro [VAR-oh], begins by asking what makes the cornfield smile and is about agriculture. In another work by this writer, a queen kills herself by falling on her lover’s sword while on a funeral pyre. This writer had that queen predict endless hate between her people and the Trojans. This author wrote that work about the son of Anchises [an-KY-seez] and the founding of Rome. Name this Roman poet of the *Georgics* and the *Aeneid*.

Answer: **Virgil** [or Publius **Vergilius** Maro]

7. This mineral is the most common crystal to occur in a twisted form called a gwindel, which is often found in alpine-type fissures. This crystal has several polymorphs, including **stishovite** [STISH-oh-vyt] and **moganite** [MOH-guh-“night”], the latter of which often forms with a form of this crystal called **chalcedony** [kal-SED-uh-nee]. **Agate** [AG-uh] and **flint** are forms of this mineral. Halogen lamps often use this mineral for their bulb. After feldspar, this is the most abundant mineral on Earth. This mineral’s **piezoelectricity** [pee-AE-zoh-“electricity”] is the reason that crystals of it are used in watches. Name this mineral that comprises sand and glass.

Answer: **quartz** or **silicon dioxide** [or **silica** or **Si O₂**]

8. In 1961, this leader ignored the advice of his biggest allies and used force to gain control of what had been a Portuguese colony. A year later, this leader was criticized for not being prepared when his country was attacked by China. This leader worked with Yugoslavian President Josip Tito to not side with the United States and Soviet Union as part of the Non-Aligned Movement. This person tried to work with Muhammad Ali Jinnah, but they ended up leading separate countries. Name this person who became the president of the Congress Party in 1929 and who in 1947 became the first Prime Minister of India.

Answer: (Pandit) Jawaharlal **Nehru**

9. In one novel by this author, a woman states “My heart and my hand shall never be separated”, causing a man to ask “Am I as hateful to you, as the vile Solmes?”. During that novel, this author describes those characters’ correspondence with Anne Howe and John Belford, respectively. In another novel by this author, the protagonist says a closet “held the worst heart in the world”. When this author has Mrs. Jervis leave the room, the protagonist is attacked by Mr. B. Name this 18th-century English author who wrote the epistolary novels *Clarissa* and *Pamela*.

Answer: Samuel **Richardson**

10. This person served as the governor of New York for two months before resigning to become U.S. Secretary of State. This person eventually resigned as Secretary of State, after having sided with the Eatons, to help Andrew Jackson re-organize his Cabinet. This person then served as vice president during Jackson’s second term. In 1848, this person was the Free Soil Party presidential candidate. When this person was president, there were a series of bank failures during the Panic of 1837. Name this successor of Andrew Jackson who lost his re-election campaign to William Henry Harrison.

Answer: Martin **Van Buren**

11. Molecular orbitals can often be predicted by an approach named for August Möbius or an approach named for this person; together, those approaches give an alternative to the Woodward-Hoffmann rules. This person and Peter Debye [duh-“BYE”] devised an equation and a limiting law that use the activity coefficient to predict the behavior of electrolytic [“elect”-roh-LIT-ik] solutions. The rule named for this person, which is not related to his work with Debye, applies to pi bonds in molecules that are cyclic, planar, and conjugated. Name this German scientist whose rule about aromatic compounds is called the “ $4n$ plus 2 rule”.

Answer: Erich (Armand Arthur Joseph) Hückel

12. In a short story by this writer, Jerrodette I tells her daddy, “Don’t let the stars run down.” Her daddy later reads “Insufficient data for a meaningful answer” in one of this writer’s stories involving the Multivac. This author of “The Last Question” set another story in a place where everybody goes insane every 2,000 years. That place is the planet Lagash, which has six suns. In addition to “Nightfall”, this author wrote a story in which Andrew Martin wants surgery performed by a robot. That story, “The Bicentennial Man”, hinges on this writer’s First Law of Robotics. Name this science fiction writer whose Three Laws of Robotics are in his collection *I, Robot*.

Answer: Isaac Asimov [or Isaak Yudovich Ozimov]

13. This compound is combined with formaldehyde to make the most common thermo-setting resin [REZ-in]. A breath test performed after swallowing this compound tests for *Helicobacter pylori* [HEL-ih-koh-BAK-tur “pie”-LOR-“eye”] infections. The cycle that produces this substance uses aspartate [uh-SPART-“ate”], and that cycle both uses and produces arginine [AR-juh-neen] and ornithine [OR-nuh-theen]. The conversion of ammonium cyanate [“SIGH”-un-“ate”] into this substance was first done by Friedrich Wöhler and was the first time an organic compound was made from inorganic reactants. Name this material that is excreted in urine.

Answer: urea [or carbamide]

14. Odin punished **Thiazi** [THEE-uh-see] by taking these body parts from him and placing them in the sky. Odin sacrificed this body part to **Mimir's** [MEE-mir'z] well to gain wisdom. The *wadjet* is a symbol depicting this body part of Horus, which he offered to **Osiris** [oh-"SIGH"-rus] after it was removed by Set. In addition to sharing one tooth, the three sisters called the **Graeae** [GREE-ee] shared one of these body parts. Shiva had three of these body parts, including one in the middle of his forehead. Name this body part of which the Cyclops were often depicted with only one.

Answer: eyes

15. A novella by this writer is about a woman who had been married to Marvin Macy for 10 days. In that novella, this writer featured a hunchbacked man named Cousin Lymon, who becomes the new love interest of Miss Amelia Evans. A novel by this author is set in a Southern town whose main eatery is the New York Café, which is run by Biff Brannon and often frequented by a heavy drinker named Jake Blount. In that novel, this author wrote about the deaf-mutes Spiros **Antonopoulos** [an-tun-uh-POO-lohss] and John Singer. Name this author of *The Ballad of the Sad Café* and *The Heart Is a Lonely Hunter*.

Answer: Carson McCullers [or Lula Carson Smith]

16. According to legend, this person said "Count no man happy until he be dead" to a person who did not appreciate the statement until years later. This person's laws forbade the export of everything except olive oil. This person also set up a *boule* [bool] of 400 people that could rule on appeals. This person's policy known as "shaking off of burdens" ended debt slavery. This person's laws, which were passed in the early 6th century BCE, used levels of property ownership to determine who could belong to the **Areopagus** [ar-ee-AHP-uh-guss]. Name this Athenian who, other than laws dealing with homicide, eliminated the Draconian constitution.

Answer: Solon [SOH-lahn]

17. This character says "So wise, so young, they say, do never live long," but when he is asked what he said, he says "Without characters, fame lives long." This character says those words to his nephew, who wants to know what happened to Rivers and Grey. In an opening monologue, this character refers to himself as "deformed, unfinished, sent before my time". This character begins that monologue "Now is the winter of our discontent." Name this title character in a William Shakespeare historical play who says "A horse! a horse! my kingdom for a horse!".

Answer: Richard III [or the Duke of Gloucester; prompt on Richard]

18. The Supreme Court ruled that this constitutional amendment does not apply to pen registers in *Smith v. Maryland*, strengthening the third-party doctrine. In 2018, this amendment was applied—in the case of *Carpenter v. United States*—to cellphones. This amendment does not apply when the plain view doctrine does apply, including the fact that the incriminating character of evidence must be immediately apparent. Name this part of the Bill of Rights that begins “The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated.”

Answer: 4th Amendment

19. This device is not an interferometer but has laser and fiber optic types that use the Sagnac [sahn-yahk] effect. The vibrating structure and Coriolis vibratory types of this device are used in many portable electronic devices. These objects are often combined with accelerometers in inertial navigation systems to track motion. The moving parts of this object have simple relationships to its Euler [OY-lur] angles. This device has gimbals and a spinning rotor. Name this device that is used to demonstrate the conservation of angular momentum and has axes that can move around.

Answer: gyroscopes

20. Rebecca Clarke, who performed on this instrument, wrote a sonata for the piano and this instrument. While a soloist on cello represents the title character in Richard Strauss’s [reek-hart shtrowss’z] *Don Quixote*, a soloist on this instrument represents Sancho Panza. Béla Bartók died while writing a concerto for this instrument for William Primrose to perform. This is the lead instrument in Hector Berlioz’s *Harold in Italy*. The lowest string on this instrument is pitched an octave below middle C. Name this instrument that joins with a cello and two violins to form a string quartet.

Answer: viola

21. When a complete graph’s number of vertices [VUR-tuh-sees] is this type of number, the chromatic index equals the number of vertices, where the chromatic index is based on edge coloring. A connected graph has an Eulerian [oy-LAIR-ee-un] cycle if none of the vertices has a degree that is this type of number. Nicomachus’s [nik-OH-muh-kuss’z] theorem states that adding these numbers produces perfect cubes. Adding the first n positive numbers of this type gives n squared. There is only one prime number that is *not* this type of number. Give this term for a number not divisible by 2.

Answer: odd numbers [accept odds]

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Bonuses

1. This phenomenon is sometimes caused by exposure to ultraviolet light or ionizing radiation.

A. Name this permanent change in a genome that can be passed to future generations.

Answer: genetic **mutation**(s) or **mutating** genes [or **mutagenesis**]

B. In this type of mutation, a single nucleotide base or base pair is changed.

Answer: **point** mutation [prompt on **substitution**]

C. In this type of point mutation, a stop codon is put into a sequence in place of an amino acid instruction.

Answer: **nonsense** mutation

2. The White Nile River flows out of this lake.

A. Name this largest lake in Africa *by surface area*. It is on the border of Kenya, Uganda, and Tanzania.

Answer: Lake **Victoria**

B. This Uganda city with an international airport is on the shore of Lake Victoria. This city is not the capital of Uganda, though they are close to each other.

Answer: **Entebbe** [en-TEB-ee]

C. This lake is the largest lake *by volume* in Africa. It is southwest of Lake Victoria and northwest of Lake Malawi.

Answer: Lake **Tanganyika**

3. This term describes several theorems, including the calculus theorem that gives the relationship between derivatives and integrals.

A. Give this word that is also used for theorems “of algebra” and “of arithmetic”.

Answer: **fundamental** theorem(s)

B. The fundamental theorem of arithmetic states that all integers greater than 1 have a unique prime factorization. What is the prime factorization of 64?

Answer: **2⁶** or **2 · 2 · 2 · 2 · 2 · 2** [do not prompt on partial answers]

C. The fundamental theorem of algebra says that non-constant polynomials have roots. Find both roots of the function “ x squared plus $20x$ plus 64”.

Answer: **-4** and **-16** [either order; do not accept or prompt on positive answers]

4. This person's rebellion killed about 60 people, and the reaction to it killed over 100 people. While awaiting trial, this person confessed his acts to Thomas Ruffin Gray.

A. Name this slave who led a rebellion in Southampton County, Virginia in 1831.

Answer: Nat **Turner**

B. This person planned a slave rebellion in 1822 in Charleston, South Carolina. He was caught, tried, and executed before the rebellion started.

Answer: Denmark **Vesey** [or **Telemaque**]

C. Some historians consider the most successful U.S. slave rebellion to be the alliance between slaves and these Native American people led by **Osceola** [ah-see-OH-luh] in Florida in 1835.

Answer: **Seminoles** or the **Seminole** people

5. One of these creatures was **Alcyoneus** [al-"SIGH"-uh-nooss], who was taken from his homeland and killed by Heracles.

A. Name these large creatures who were the offspring of **Gaia** ["GUY-uh"] and Uranus after the Titans, and who lost a major war to the Olympian gods.

Answer: **giants** [or **Gigantes**]

B. The giants were born after this Titan castrated Uranus.

Answer: **Cronus**

C. Much of our knowledge of Greek beliefs about giants comes from this person's compendium of myths, the **Bibliotheca** [bib-lee-oh-TEH-kuh].

Answer: Pseudo-**Apollodorus** [or **Apollodorus** of Athens]

6. Warren Burger was the Chief Justice of the United States from 1969 to 1986.

A. In 1973, the Supreme Court ended many restrictions on this general type of medical procedure in its *Roe v. Wade* decision.

Answer: **abortion** [or **aborting** fetuses; do not accept or prompt on putative synonyms or descriptions]

B. Burger wrote the decision taking away the tax-exempt status from this evangelical university in South Carolina that did not allow interracial dating.

Answer: **Bob Jones** University

C. The Burger court required the University of California at Davis to allow this person into its medical school due to an affirmative action lawsuit.

Answer: Allan **Bakke** [BAK-ee]

7. In this novel, Blore is killed when a heavy clock falls on him.

A. Name this novel that involves ten figurines on a table on a remote island. The figurines break as the visitors to the island are killed one at a time.

Answer: **And Then There Were None**

B. *And Then There Were None* was written by this English writer of *The Mousetrap*.

Answer: Agatha (Mary Clarissa Miller) Christie [accept either underlined name]

C. Christie wrote many novels featuring the detective **Hercule Poirot** [air-kyool pwah-roh], including one named for the murder of this fiancé of Mrs. Ferrars.

Answer: Roger Ackroyd [accept either]

8. Benny Goodman was known as the “king of” this type of music that was associated with big bands.

A. Name this jazz style dominant during the 1930s and '40s.

Answer: swing

B. This bandleader composed “It Don’t Mean a Thing If It Ain’t Got That Swing”, and Irving Mills wrote the lyrics.

Answer: (Edward Kennedy) “Duke” Ellington

C. These brothers and bandleaders created a lot of swing music during their collaboration that lasted until 1935, when Tommy left Jimmy.

Answer: Dorsey brothers or the Dorseys [or Thomas Francis “Tommy” Dorsey Jr. and James Dorsey]

9. The equinox is when the Sun is directly over the Equator.

A. Give the name common to the times in June and December when the Sun’s apparent path is farthest north or south.

Answer: solstice

B. During a solstice, the longitude angle named for this path is 90 or 270 degrees. This path is the apparent path taken by the Sun.

Answer: ecliptic [ee-KLIP-tik]

C. This apparent or real oscillation of the moon is caused by its elliptical shape and inclination to the ecliptic.

Answer: lunar libration

10. This person famously crossed the Alps with elephants.

A. Name this leader of Carthage during the Second Punic War.

Answer: **Hannibal (Barca)** [accept either]

B. The Second Punic War ended when Hannibal lost to Scipio [SKIP-ee-oh] Africanus at this battle in 202 BCE.

Answer: Battle of **Zama**

C. After that defeat, Hannibal helped this leader of the Seleucid [suh-LOO-sid] Empire, who eventually was also defeated by the Romans.

Answer: **Antiochus** [an-“TIE”-oh-kuss] **III** or **Antiochus the Great** [prompt on **Antiochus**]

11. This painting is set on the border of Suffolk and Essex counties.

A. Name this 1821 painting that shows the title vehicle crossing a river.

Answer: *The **Hay Wain***

B. This British artist painted *The Hay Wain* as well as *The Vale of Dedham*.

Answer: John **Constable**

C. Constable made multiple paintings of the cathedral in this town, showing it from the Bishop’s Grounds and from the Meadows.

Answer: **Salisbury**, Wiltshire, England [accept **Salisbury** Cathedral]

12. This coordinate system uses two distances and one angle.

A. Name this three-dimensional coordinate system that uses polar coordinates plus a z -coordinate.

Answer: **cylindrical** coordinates

B. In cylindrical coordinates, what is the shape when you graph the equation “ z equals r ”?

Answer: (right circular) **cone** [accept double **cone**]

C. Find the volume between the cone generated by “ z equals r ” and the xy -plane, as r goes from 0 to 1.

Answer: **2 pi/3** or **2/3 pi**

13. This African country is in much of the same region that was in Nubia [NOO-bee-uh] and Kush in ancient times.

A. Name this country whose southern section seceded in 2011. Name the country from before the secession, not the new country.

Answer: (Republic of the) **Sudan** or (Jumhuriyyat as-) **Sudan** [do not accept “South Sudan”]

B. After helping to put down the Taiping Rebellion, this Englishman became the governor-general of the Sudan. He was killed by forces supporting a religious figure called the Mahdi.

Answer: Charles “Chinese” **Gordon**

C. This Englishman won the Battle of Omdurman in 1898 to gain control of Sudan. After that, this person and Lord Roberts used brutal tactics in the Second Boer War.

Answer: Lord Herbert **Kitchener**

14. The composition of this material varies, but much of it is naphthenes [NAF-theens].

A. Name this mixture, found in the Earth, that is mostly crude oil.

Answer: **petroleum** oil

B. Another major component of petroleum is this type of hydrocarbon, in which the number of hydrogen atoms in each molecule is two more than twice the number of carbon atoms.

Answer: **alkane**(s) [accept **paraffin**(s)]

C. This process creates alkanes and water from hydrogen and carbon monoxide.

Answer: **Fischer-Tropsch** process

15. This character tells Elmire [el-meer] “You are my peace, my solace, my salvation; on you depends my bliss or desolation.”

A. Name this title character of a French play who is the houseguest of Orgon.

Answer: **Tartuffe** [tar-toof]

B. This bailiff serves eviction papers to Orgon. Dorine states that this person’s name and his actions are opposites.

Answer: Monsieur **Loyal**

C. This playwright wrote *Tartuffe* as well as *The Misanthrope* and *The School for Wives*.

Answer: **Molière** [moh-lee-air] [or Jean-Baptiste **Poquelin**]

16. This process is often classified as divergent, convergent, or parallel.

A. Name this process by which organisms develop through natural selection.

Answer: **evolution** or **evolving**

B. This term refers to species that are **monophyletic** [mah-noh-fy-LET-ik], meaning they have a common ancestor. There is an effort to make all organism classifications be these types of groups.

Answer: **clades** [rhymes with “spades”]

C. One example of convergent evolution is that both these monotremes and porcupines have spiny skin, which they developed independently.

Answer: **echidnas** [eh-KID-nuhz]

17. The protagonist of this novel states “You might as well advise me to give up my fortune as my argument.” His friend then says “Your fortune, I am now sorry to inform you, is almost nothing.”

A. Name this novel about a family that is almost destroyed by Squire Thornhill, but saved by Mr. Burchell.

Answer: *The **Vicar of Wakefield***

B. This author wrote *The Vicar of Wakefield* and the play *She Stoops to Conquer*.

Answer: Oliver **Goldsmith**

C. In Jane Austen’s *Emma*, the title character says of this man, “I know he has read *The Vicar of Wakefield*.” This character eventually marries Harriet Smith.

Answer: **Robert Martin** [accept either]

18. This type of division can be used when dividing any polynomial by a first-degree polynomial.

A. Name this type of division that usually is faster than long division.

Answer: **synthetic** division

B. Divide the quantity “ x squared minus $5x$ minus 14 ”, end quantity, by the quantity “ x plus 2 ”.

Answer: **$x - 7$** [or **$x + -7$** ; accept either of those answers with a 1 before the x]

C. Find the remainder when the quantity “ $2x$ cubed plus $4x$ squared plus $3x$ plus 5 ”, end quantity, is divided by the quantity “ x minus 2 ”.

Answer: **43**

19. This phenomenon is not possible in classical mechanics but can happen in quantum mechanics.

A. Name this phenomenon in which a particle passes through a barrier even though it does not have enough energy to do so.

Answer: quantum **tunneling**

B. Tunneling explains this type of radioactive decay, in which a particle with two protons and two neutrons is emitted.

Answer: **alpha** decay

C. This Soviet-American physicist used tunneling to explain alpha decay. The “factor” named for this person helps determine the likelihood of nuclear fusion.

Answer: George **Gamow** [or Georgiy Antonovich **Gamov**]

20. In the second chapter of this novel, the protagonist describes the hair of each of her family members, saying that her mom’s “is the warm smell of bread before you bake it”.

A. Name this novel in which the narrator says “In English my name means hope. In Spanish it means too many letters.”

Answer: *The **House on Mango Street***

B. In *The House on Mango Street*, Darius says that one of these objects looks like God. During a discussion about naming these objects, a girl tells Esperanza that she has an ugly fat face.

Answer: **clouds**

C. This Mexican-American author wrote *The House on Mango Street* as well as “Woman Hollering Creek”.

Answer: Sandra **Cisneros**