

1. Palanque-Delabrouille [‘puh-LAHN-KAY deh-lah-BREW-eel’] et al modified the SALT2 fitter to also fit for this quantity. Loh and Spillar 1986 used measurements in 6 nonstandard filters to develop a template fitting method to find this quantity. In 1962 W.A. Baum used observations of the Virgo Cluster to develop another method for finding this quantity that relied heavily on the 4000 Angstrom break so it could only be used on elliptical galaxies. Differences in this quantity necessitate the (*) “K correction” of their measured magnitudes. The [OII] [“oh-two”] doublet and Silicon line at 615 nm are useful in determining this quantity for ELGs and Type Ia supernovae respectively. In the classical limit, this quantity multiplied by the speed of light gives the recession velocity. For 10 points, name this quantity, symbolized z , which indicates the degree to which the Doppler effect moves light frequency towards longer wavelengths or a certain color.
ANSWER: **redshift** [accept z before mentioned, prompt afterwards; prompt on Doppler effect by asking “what quantity?”]

**2. In 2017, this organization created an April Fools prank that involved finding the location of a fictional research facility in Verkhoyansk, Russia and fighting to free this organization’s leaders in Times Square. The founder and “Executive” of this organization is a self-described addict of Dr. Pepper and used it in the early days of this organization to fuel APK takedowns.. Recently this organization started creating official themed competition rules such as Kingdom and Voyager cups. Moots and (*) Dronpes are the founders and leaders of this organization. One of the first projects of this organization was a nest map. This organization originally formed to facilitate worldwide trades, but pivoted when trades were not part of an initial release. For 10 points, name this Pokemon Go fan group whose name is derived from the corporation in the Pokemon Gen 1 games and a medieval trade route.
ANSWER: The **Silph Road** [also accept the **Silph Arena**; do NOT accept or prompt answers referencing “the pokemon go subreddit”]**

**3. A heavy duty rubber tube reinforced with Aramid was special ordered from an Italian company to construct a project in this location. The Dark Energy Survey chose the sky region of its Science Verification data based on what was observed by an experiment in this location. It’s not a Hawaiian Island, but the Keck array is operating in this location. Along with Planck [“plahnk”] and A·C·T·pol, an experiment in and named for this location is a stage III [“three”] CMB experiment. Experiments like TIGER, BOOMERANG, BLAST, and other balloons are launched from this location due to the (*) circular wind currents making them easier to recover. The erroneous detection of primordial gravitational waves in the CMB was performed by BICEP-2, an experiment in this location. This location is ideal for astronomical experiments because of its low humidity and 3 months of total darkness. For 10 points, name this location where the neutrino detector IceCube is drilled into its continental ice sheet.
ANSWER: **South Pole** [also accept **Antarctica**; generously prompt on Southern Hemisphere; do NOT accept or prompt on “North Pole”]**

**4. Goose Gossage once said that this pitcher “could hit a gnat in the butt with a pitch if he wanted to.” Along with Mike Brumley, this player was traded to the Cubs for noted goat Bill Buckner. This pitcher only allowed Tony Solaita and Bobby Bonds to reach base when he no-hit the California Angels in 1977. In 2019, this player, Jerry Remy, and Dave O’Brien served as the Red Sox home broadcasting booth. This man and John Smoltz are the only two pitchers to record both 20 win and (*) 50 save seasons. After Rollie Fingers and Willie Hernandez, he is the most recent reliever to win both Cy Young and MVP. In addition to referring to home runs as “street pieces” this player coined the term “walk off” home run in relation to his walking off the field after the home run he gave up in the 1988 World Series to Kirk Gibson. For 10 points, name this longtime closer for the Oakland Athletics.
ANSWER: Dennis **Eckersley** [prompt on Eck]**

5. This man was the first to establish the use of spider silk as cross hairs in telescope eyepieces, and he later created the first diffraction grating using 50 hairs spaced over a half inch. The first orrery constructed in the US was built by this man, which led to his honorary degree at Princeton. This man constructed most of the instrument for an observation during which he fainted due to excitement, the 1769 transit of Venus. Andrew Ellicot and this man completed the survey work of Mason and Dixon. This non-Franklin scientist served as the first director of the(*) US Mint. Thankfully, no quizbowl events have been held in the Penn Physics laboratory building named for this scientist. This scientist lends his name to a neighborhood inside of Center city. For 10 points, name this early american scientist who names the ritzy home of Barclay Prime, his namesake “square” in Philadelphia.

ANSWER: David Rittenhouse [accept DRL for the Penn Physics building which is literally hell]

6. Some unresolved plotlines in the series featuring this character were resolved in a movie subtitled “the Jungle Movie.” He isn’t related to quizbowl, but this character freed Lorenzo from the rigidity of viola lessons, meetings, and studying flashcards by pushing him into a mud pit at the dump. This character gets diagnosed with “Dangerous Lumber” by a baseball playing idol of his who had recently opened an “All-Natural Casings Dog Pound,” Mickey Kaline. The song, “You’d Better Not Touch My Gal” is performed by this characters favorite singer, (*) Dino Spumoni. In a Christmas special, this character reunites a housemate of his with his daughter who was separated from him on a helicopter out of South Vietnam. This character is taught by Mr. Simmons at P.S. 118 and lives at the Sunset Arms boarding house with his grandparents. Helga Pataki maintains a shrine to this character whose best friend is Gerald Johanssen. For 10 points, name this titular Nickelodeon character with a football shaped head.

ANSWER: Arnold Phillip Shortman[accept Hey Arnold!]

7. An empirically motivated step function correlated this property for galaxies with the luminosity of their hosted supernovae. I-C 1101 has the largest known value of this quantity for galaxies. It’s not age, but dwarf-spheroidals with higher metallicity have higher values of this quantity. Kroupa measured a flattening of the power law describing the distribution of this quantity which was first measured to have a constant index of -2.3 by(*) Salpeter. The velocity dispersion around a galactic center is proportional to this quantity for that galaxy’s central object. This quantity is in the numerator of a ratio observed by Fritz Zwicky to be surprisingly over 500 for several nearby galaxy clusters, leading him to propose the existence of dark matter. For 10 points, name this quantity which is about 2 times 10 to the 30th grams for the Sun.

ANSWER: mass [accept answers like Solar mass or similar]

8. A villain in this game sings “Set in my sights,/ get you tonight./ Love in the crossfire./ Ready, aim, fire!” That villain’s name is Praline ala Mode. This game allows you to recruit villagers via streetpass to repair the village of Norende [“nor-en-DAY”], which was replaced in a sequel by a village on the Moon. After a critical betrayal in this game, the subtitle flashes to reveal that the phrase “Airy Lies” was hidden all along. The two words that make up this game’s name are also its two (*) battle mechanics, which allow you to bank turns while defending or “courageously” take extra turns to perform consecutive actions at the cost of future turns. This game shows Edea [“eh-DEE-uh”], Ringabel [‘ring-a-bell’], Tiz, and Agnes [‘AH-nyess’] trying to calm the four crystals of Luxendarc [‘LUCKS-en-dark’]. For 10 points, name this game which draws from but is not a member of the Dragon Quest and Final Fantasy series, other products of its creator Square Enix.

ANSWER: Bravely Default [prompt on Bravely Second by asking for the series name]

9. **This entity developed a new binary data storage type composed of collections of T·Files and T·Trees known as ROOT. Fred James and Matts Roos developed a package containing MIGRAD [‘MEE-grahd’] and MINOS [‘MEE-nohs’] named MINUIT [‘min-WEE’] while working for this entity. This entity sponsors the development of I·C·T technology** through its “Openlab” project. This organization controls a computing network known only as “The Grid,” which possesses “Tier 1” sites at (*) TRIUMF [“triumph”] in Canada and Brookhaven in the USA. This organization sponsored Project ENQUIRE which was led by Tim Berners-Lee. This organization’s flagship project generates 15 petabytes of data per year, mostly in the form of particle trails. For 10 points, name this organization that runs the Large Hadron Collider.**

ANSWER: CERN [or European Organization for Nuclear Research or Conseil européen pour la recherche nucléaire] ** (yes, pun intended)

10. **This person won 17 games on the original Concentration and is (according to my research) the most famous contestant in the Challenge of Champions on that show. Before the second most notable moment in his career he told his brother that if a gunman with wayward aim shot him rather than his friend he’d “have died a hero.” A Wall Street Journal article in 2001 broke the story that this man was the victim of a telescope and buzzer (*) sign stealing scheme. During Opening day of his only 20 win season in 1947, he was the only player to stand next to Jackie Robinson during introductions. While wearing unlucky number 13, this player delivered a curveball that was hit over Andy Pafko’s glove into the Polo Grounds seats by Bobby Thomson. For 10 points, name this pitcher who gave up the “Shot Heard ‘Round the world.”**

ANSWER: Ralph Branca

11. **Although this term was not yet coined, Schutz published a 1986 paper outlining this method. Li, Pozzo, and Messenger determined the effect of tidal deformability on measurements with this method. Ninety six·fifths times eight·thirds pi times a mass parameter to the five thirds times frequency to the eleven thirds equals the change in frequency with time measured in this method. Observation of a kilonova associated with a (*) gravitational wave event allowed the first instance of Hubble Constant measurement using this method. This method uses a known frequency unlike similarly named rulers and candles. For ten points, name this type of astronomical distance indicator which shares part of its name with an object on an ambulance or a monster from greek myth.**

ANSWER: standard siren [prompt on things related to “gravitational wave measurements”]

12. **** MODERATOR NOTE: Please don’t say the name Kike like the racial slur, use the pronunciation guide****

A player on this man’s team said that “Honestly, I don’t think he’d hit puberty yet. On the bus, it sounded like a girl was on our team.” In a 2011 game against the Giants, this player hit his first MLB home run as an inside-the-park homer. Bryan Trostel created a metric which is based on this player, the OSLA. In the same postseason as Kike [*‘KEY-kay’] Hernandez, this player hit(*) three home runs in a game. This player dubiously cited a tattoo as the reason he wouldn’t allow his jersey to be removed after his walkoff home run sent his team to the World Series. This player won the 2017 American League MVP over Aaron Judge. For 10 points, name this “Mighty Midget,” a notably short shortstop for the Houston Astros.**

ANSWER: Jose Altuve

13. **This was the first team of a player who, for his prowess at secretly lighting teammates shoelaces on fire, was nicknamed the “Frying Dutchman.” They aren’t the Pirates, but this team’s lineup in 1977 was known as the “Lumber Company.” Ozzie Guillen dubbed the 2006 lineup for this team the “little piranhas,” a group including Jasons Tyner and Bartlett. Tom Kelly managed this team to its most recent World Series title. Randy Dobnak worked as an (*) Uber driver while in the minors for this team. This team began its existence as the Washington Senators before moving to its current location. This team’s recent All-Stars include Miguel Sano**

and Jose Berrios. Borderline Hall-of-Famer Joe Mauer spent his entire career with this team. For 10 points, name this AL Central franchise which plays in Target Field in Minneapolis.

ANSWER: Minnesota Twins [accept either underlined part; The “Frying Dutchman” is Bert Blyleven]

14. This musician’s obituary said that he “approached his music almost as an athletic event” and that “We cheered [him] as a gladiator, a combat soldier, a prize fighter, a circus strongman.” This musician’s band recorded a song whose theme began: quarter note D [pause] eighth note E D [pause] half rest. Quarter note B [pause] eighth note A G [pause] half rest. That song recorded by this musician was Gospel John. This musician updated the lyrics of “I can’t get started” to say “Linda Lovelace thinks I’m obscene” and “Stan Kenton made me a star.” This bandleader included Herb Geller, Wayne Shorter, and Joe Zawinul in his (*)“Birdland Dream Band.” This musician created instruments named the “firebird” and “superbone,” and he often doubled on the valve trombone. The album “Conquistador” featured this musician playing the Star Trek theme, and “Gonna Fly Now” from Rocky. For 10 points, name this Canadian Jazz trumpeter and bandleader with notoriously high range.

ANSWER: Maynard Ferguson

15. This woman is the star of a show where she appears as an animatronic fending off a dinosaur “220 million years ago, give or take a day.” In that show, she faces Albert Einstein and her former roommate “Stupid Judy” in the dream sequence version of Jeopardy. This woman co-starred with Bill Nye in that EP·COT attraction, Universe of Energy. Despite signing a 5 year contract, this woman served as an American Idol judge only during season 9. This woman hosts a show which features events like Danger Word, You Bet Your Wife, Know or Go, and the bonus round, Hot Hands. That show is this woman’s(*) Game of Games, and features Twitch, a DJ from her main show. This woman is the author of the fourth most retweeted tweet ever, a selfie featuring 12 celebrities. In a famous film appearance, this woman says “Just keep swimming” to Marlin, who’s looking for his titular son. For 10 points, name this voice actress of Dory, a lesbian talk show host.

ANSWER: Ellen Degeneres [accept either underlined part]

16. During an event known natively as Śmigus-Dyngus following this holiday, Polish boys throw water on girls and spank them with willow branches. Objects called pisanki [‘peace-AHN-keeh’] are created for this holiday with substances made from boiled onion peels and rye sprouts. Norway has a tradition of publishing murder mysteries on this holiday. In Florence, the Scoppio del carro or “Explosion of the cart,” occurs on this holiday. The blessing “Christ Yesterday and Today, the Beginning and the End” is said to dedicate a new(*) candle for Churches for the year after this holiday. This holiday is the earliest in the calendar year where white vestments are used. The “Triduum” [‘trih-dew-UM’] is the name of the days leading up to this holiday including Good Friday. For 10 points, name this holiday celebrating Jesus’s resurrection.

ANSWER: Easter Sunday [prompt on answers involving Jesus’s resurrection]

17. This player, Koyie Hill, and New York Mets legend Mike Nickeas comprised the Kansas Stars roster at his position. This player was drafted twice by the LA Dodgers, once before he decided to commit to playing college ball at Auburn. This player “wrote” the autobiography “Teammate” about his “Journey in Baseball.” During his stint with the Reds, he served as personal(*) catcher to Bronson Arroyo. Though it was lost in a controversial infield fly call, this player hit the only Braves home run in the 2012 NL wild card game. This player and Lindsay Arnold were runner up to Rashad Jennings and Emma Slater on Dancing with the Stars. This player hit a home run off Andrew Miller in the last at bat of his career, during game 7 of the 2016 World Series. For 10 points name this catcher and current Cubs manager.

ANSWER: David Ross [accept “Grandpa” Rossy or similar nicknames indicating age]

18. An unusually useful example of this phenomenon is produced by the “Jackpot” object. The H0LiCOW [“Holy cow”] project measured the Hubble Constant using this phenomenon. Simple models involved in this phenomenon include the Softened and Single Isothermal Sphere models. Sjur Refsdal [“SEE-yur REFS-dahl”], a pioneer in studying this phenomenon, names the first supernova in which it was observed. One form of this phenomenon is measured with(*) shear and convergence maps. The EROS survey tried to detect MACHO dark matter by measuring this phenomenon. This phenomenon can produce “rings” and “crosses” which are named for Einstein. For 10 points, name this general relativistic phenomenon, observed in “strong,” “weak,” and “micro” varieties, where a mass behaves like an optical device.

ANSWER: **Gravitational lensing** [prompt on partial answer. Accept any specific subtype such as **Strong lensing**, **weak lensing**, or **microlensing**]

19. A person with this last name owns the youtube channel named “enyay.” That person with this surname tries to get his friends Chris Joel, Gary Brannan, and Matt Gray, a.k.a the Technical Difficulties, to guess clues from a random wikipedia article in his show “Citation Needed.” In addition to Tom, a more famous person with this surname has at various points controlled AHN, Pharmaca, and Solantic. That person with this surname defeated(*) Alex Sink in his first gubernatorial election. In his most recent election, that man with this surname defeated Bill Nelson by 10 thousand votes to become a senator. For 10 points, give the last name of this Junior senator from florida along with Marco Rubio.

ANSWER: **Scott** [accept specific first names like Tom **Scott**; and Rick **Scott**]

20. WARNING: TWO ANSWERS REQUIRED. The damping term in an equation named for this pair was replaced with one that depends on the time derivative of the Magnetization by Gilbert. It’s not related to Leonard Susskind, but one of this pair developed an exam called the “Theoretical minimum” which the other was the second of 43 to ever pass. This pair’s most famous work was composed in an(*) NKVD prison by one member but later transcribed by the other. This led to the description of their most famous work as being “not a word of [one]; and not a thought of [the other].” For 10 points, name these two physicists who together are credited with the Course in Theoretical Physics.

ANSWER: Lev **Landau** and Evgeny **Lifshitz** [accept last names in either order]