

TOSSUP 1

They are equal to the negative gradient of potential energy when they are conservative. The dot product of one with a velocity gives power; dotting with distance yields work. They are defined as the rate of change of momentum with respect to time. FTP, what are these vector quantities, best known as the product of mass and acceleration?

Forces

BONUS 1

Identify these types of forces FTPE.

- 10: The component of a contact force between an object and a surface that is perpendicular to the surface.

Normal force

- 10: The force that draws an object in circular motion towards the center of the circle.

Centripetal force

- 10: The fundamental force that acts on quarks and gluons, holding hadrons together.

Strong (nuclear) force or interaction

TOSSUP 2

It began when the Nawab of Bengal became suspicious of the British Company in his country, perceiving them as a threat to Bengal's independence. His concerns rested mainly in the British escalation of military presence in Fort William. The Nawab laid siege to the fort after the British refused to stop enhancing their military and finally captured it, along with 65 of the British garrison force. After the prisoners began rebelling, they were placed in a 14 by 18 foot guard room. In the morning 43 of the British were dead in, FTP, what 1756 incident occurring in a city in India?

Black Hole of Calcutta

BONUS 2

Answer the following questions about other war crimes, FTPE.

- 10: Beginning in 2004, abuse at this Iraqi prison, also known as the Baghdad correctional facility, was made known to the public.

Abu Ghraib

- 10: George Patton ordered that American soldiers receive no punishment for killing 50 to 120 SS soldiers at this concentration camp, which was constructed in a used gunpowder factory in a town just outside of Munich.

Dachau massacre

- 10: US Army Lieutenant William Calley was convicted of massacring hundreds of Vietnamese civilians in this village, and then released from prison by Richard Nixon.

My Lai

TOSSUP 3

The young man being addressed will not be swelling the rout of his colleagues who outlasted their names. It contrasts the glories of success, like being borne through town on a chair, with the indifference of the grave. FTP, name this poem about an expiring runner by A. E. Housman.

To an Athlete Dying Young

BONUS 3

Identify the British poets who wrote these lines FTPE.

- 10: "What immortal hand or eye/Could frame thy fearful symmetry?"

William Blake

- 10: "Beauty is truth, truth beauty."

John Keats

- 10: "Rage, rage against the dying of the light."

Dylan Thomas

TOSSUP 4

Francis Bacon described this man as "of a high mind, and loved his own will and his own way." He married off his eldest son for peace with Spain, and his eldest daughter for peace with Scotland. Following his victory in the Battle of Bosworth Field, he was proclaimed king in 1485. FTP, name this man who ruled for 24 years as the first monarch of the Tudor dynasty.

Henry VII

BONUS 4

FTPE, name these female Tudor monarchs.

- 10: She ruled for 45 years, and was the last of the Tudor monarchs.

Elizabeth I

- 10: She revived Roman Catholicism in England, and was succeeded by Elizabeth.

Mary I or Bloody Mary

- 10: She ruled for nine days, between Edward VI and Mary I.

Jane Grey

TOSSUP 5

Hepzibah, an old woman fallen on hard times; Clifford, her weak brother; and Phoebe, who comes from New England to help her feeble relatives, are the main characters in this novel. The antagonist of the story is a smooth talking judge, a relative of Hepzibah and Clifford, who wants to acquire the house. The family lives in a cursed house that has passed through numerous generations. FTP, name this 1851 novel by Nathaniel Hawthorne.

The House of the Seven Gables

BONUS 5

BONUS FTPE, answer the following questions about The House of Seven Gables.

- 10: This family has lived in the house ever since its construction.
Pyncheon
- 10: This man owned the land that the house was built on before he was hanged for witchcraft.
Matthew Maule
- 10: This lodger at the house, also a descendant of Matthew Maule, possesses hypnotic powers.
Holgrave

TOSSUP 6

This character briefly appeared in Alan Moore's comic book series The League Of Extraordinary Gentlemen. He lives in an old house in Paris, and was one of the first of his kind in literature. Arthur Conan Doyle used him as a blueprint for Sherlock Holmes, even though Holmes belittles him in "A Study In Scarlet". FTP, name this detective who famously appeared in "The Murders in the Rue Morgue" and was created by Edgar Allan Poe.

Auguste Dupin

BONUS 6

BONUS FTPE name these other Edgar Allan Poe works.

- 10: This haunted house story tells the tale of an unnamed narrator who visits Roderick and his sister Madeline.
The Fall of the House of Usher
- 10: The title objects "jingle and tinkle" in the beginning before "moaning and groaning" at the end
The Bells
- 10: This short story takes place at an abbey, in which people have crowded in to escape a plague.
The Masque of the Red Death

TOSSUP 7

Although he was king of one of the most powerful empires of his time, he neglected much of it. This led to trouble along the frontiers, especially those bordering land claimed by the Mitanni. After his death, all the changes he had made to his empire's religion were undone and his young successor, Tutankhaten, was persuaded by priests to change his name to Tutankhamun. FTP, name this ancient Egyptian Pharaoh who declared that all of his subjects must worship Aten, the sun god, which forms part of his name.

Akhenaten (or Amenhotep IV)

BONUS 7

FTPE, name these Egyptian deities other than Aten.

- 10: This sun god disappeared at sunset, then reappeared each morning after defeating Apep, the god of darkness and chaos.

Ra

- 10: Depicted with the head of an ibis, he was the god of writing.

Thoth

- 10: He embodied the Nile's fertile yield and was represented with the head of a crocodile.

Sobek

TOSSUP 8

Due to its constant $O(n^2)$ [oh of en squared] time for unsorted lists, this algorithm is inefficient for sorting large amounts of data. It works by comparing adjacent elements and swapping them if the first is greater than the second, and then keeps repeating for one fewer element each time, until no more pairs are left to compare. FTP, name this sorting algorithm, one of the easiest to implement.

Bubble Sort (accept Exchange Sort)

BONUS 8

BONUS FTPE, identify these other sorting algorithms from their given descriptions.

- 10: This sorting algorithm finds the minimum value in a list and swaps it with the first value, and so on.

Selection Sort

- 10: Choosing a pivot point and arranging elements into two sub-lists and then recursively sorting them, this sort has an average of $O(n \log n)$ [oh of en log en] time.

Quick Sort

- 10: This sort, despite its $O(n^2)$ time, is more efficient than selection or bubble sorts. It is especially fast at sorting lists that are almost in order.

Insertion Sort

TOSSUP 9

According to the second Merseburg Charm, the German name for this god was Phol. Odin defeats the giant Vafthruthnir in a game of riddles by asking him what he - Odin - whispered in this god's ear at his funeral pyre, a thing only Odin himself would know. He will be resurrected after Ragnarok and will rule the new earth, reconciled with Hod, his accidental murderer by mistletoe. FTP name this Norse god of innocence, joy, purity, beauty, and peace, murdered in a plot by Loki.

Baldur

BONUS 9

Name all of these things about Ragnarok FTPE.

- 10: Immediately preceding Ragnarok, there will be three successive winters with no other seasons in between. Name this time during which there will be much internecine strife in the human race.

Fimbulwinter

- 10: The "world tree", called this, will shake the universe from Asgard to Hel prior to the battle.

Yggdrasil

- 10: Thor uses this hammer.

Mjollnir

TOSSUP 10

This element has several extremely rare compounds- all of which are highly unstable. It is the second most abundant element in the universe as well as the second lightest element and almost always exists as a gas. It is used in cryogenics, deep-sea breathing systems, and as a superconducting magnet coolant but perhaps its most famous use is in inflating balloons. FTP, name this noble gas whose atomic number is two.

Helium

BONUS 10

FTPE, answer the following about noble gases:

- 10: This element has the atomic number 10 and gives off a distinctive red glow when used in vacuum tubes and its eponymous lights.

Neon

- 10: This noble gas has no known industrial purposes but does form compounds with fluorine, its atomic number is 36.

Krypton

- 10: Name the last of the noble gases, which forms from the disintegration of radium with atomic number 86.

Radon

TOSSUP 11

In German, adjective endings for both definite and indefinite articles will be “-en”. In Latin, it is identical to the ablative in the plural for all declensions. In the sentence “To whom did you send the letter?” the word “whom” is in this case. FTP, name this case used for indirect objects, which, in chemistry, also refers to a covalent bond where one atom donates both electrons.

Dative

BONUS 11

FTPE, name these other grammatical cases, given their part of speech.

10: Possessive noun

Genitive

10: Direct object

Accusative

10: Subject

Nominative

TOSSUP 12

Its name means “deer hunter” in Sanskrit, and takes its modern name from the Greek “glowing”. The smaller of the two bodies is not visible to the naked eye because its companion is one of the brightest stars in the night sky. Only 8.6 light years away from Earth, this pair is known for its vivid blue-white color. FTP, identify this binary star, located in the constellation Canis Major, which is also known as the “Dog Star.”

Sirius

BONUS 12

FTPE, name the brightest star in the following constellations.

10: Taurus

Aldebaran

10: Scorpio

Antares

10: Aquila

Altair

TOSSUP 13

Pencil and paper ready. A garden is in the shape of an isosceles triangle with side lengths 10, 13, and 13. To determine the area of this garden, one could use Heron’s formula, or one could realize that the altitude of the triangle to the side of length 10 can be found using a Pythagorean Triple. FTP, find the area of a triangle with side lengths 10,13, and 13.

60

BONUS 13

FTPE, find the area of the following triangles:

10: A triangle with sides 6, 8, and 10.

24

10: A triangle with sides 9, 40, and 41.

180

10: A triangle with sides 4, 4, and 4.

$4\sqrt{3}$

TOSSUP 14

Before explorers arrived there in the 1600s, it was home to numerous indigenous peoples including the Chukchi [CHUCK-chee] and the Koryak. Kurilsky Lake, in the south, is the largest salmon breeding ground in Eurasia. It contains over 160 volcanoes, more than 20 of which are active. FTP, name this Russian peninsula located between the Sea of Okhotsk [ok-HOT-sk] and the Pacific Ocean.

Kamchatka Peninsula

BONUS 14

FTPE, name these other peninsulas.

10: Myanmar, Thailand, and a country that closely shares its name all have possession of a portion of it.

Malay Peninsula

10: It is shared by Germany and Denmark and separates the North Sea from the Baltic Sea.

Jutland Peninsula

10: Located at the mouth of the St. Lawrence River, its name comes from a Micmac word meaning "Land's End."

Gaspé Peninsula

TOSSUP 15

In his twenties, this man worked in a chemical factory in the Urals. Stalin exempted him from arrest during the great purges, saying "Don't touch this cloud dweller." At the same time, this man had been translating works of Shakespeare, which he altered slightly. FTP, name this Russian author, who was forced by the Soviet government to decline the 1958 Nobel Prize for his novel *Doctor Zhivago*.

Boris Leonidovich Pasternak

BONUS 15

FTPE, name these characters from *Doctor Zhivago*.

- 10: Doctor Zhivago's wife, who is exiled to France.
Tonya
- 10: The woman Doctor Zhivago truly loves.
Lara Antipov
- 10: Lara's husband, who disappears during World War I and reemerges during the Civil War.
Pasha Antipov or Strelnikov

TOSSUP 16

He studied lyric-writing with Oscar Hammerstein. He first came to public attention as the lyricist for Leonard Bernstein's *West Side Story*, but soon moved to writing both words and music in a series of productions which redefined American musical theater. His own highly successful musicals included *A Funny Thing Happened on the Way to the Forum* and *A Little Night Music*. FTP, name this American composer and lyricist who combined opera, musical comedy, and cabaret in *Sweeney Todd*.

Stephen Sondheim

BONUS 16

FTPE, name these composers of musicals.

- 10: He collaborated with lyricist Lorenz Hart on *Pal Joey* and later with Oscar Hammerstein on *The Sound of Music*.
Richard Rodgers
- 10: Hammerstein wrote the book and lyrics to *Show Boat* in collaboration with this man.
Jerome Kern
- 10: Although usually associated with its director and choreographer, Michael Bennett, *A Chorus Line* was actually composed by this man.
Marvin Hamlisch

TOSSUP 17

His early experiments involved a device to convert electromagnetic waves into electricity. He conducted successful tests with transmitting signals across the English Channel and later across the Atlantic Ocean and formed the company which bore his name in London, England. He established a worldwide radio telegraph network for the British government. FTP, name this inventor of short-wave radio equipment.

Guglielmo Marconi

BONUS 17

FTPE, name these pioneers of radio:

10: This man left his family business to invest in several radio stations which became the Columbia Broadcasting System, or CBS:

William S. Paley

10: A telegraph operator who helped the Titanic rescue effort by informing other ships about the accident, he is credited with creating the National Broadcasting Network, or NBC from the Radio Corporation of America, or RCA:

David Sarnoff

10: He made broadcast history with William Shirer in 1938 when they organized a special broadcast with European reaction to the seizure of Austria by Nazi Germany:

Edward R. Murrow

TOSSUP 18

Its name comes from a Native American leader of the Lenape tribe. The political activities it is well known for started in the late 1700's when Aaron Burr became the leader. Burr used it to become Vice President in 1800. In the 1840's, people of Irish descent began joining it, providing bribes in exchange for votes. It achieved one of its greatest successes when Al Smith won the 1928 Presidential nomination. FTP, identify this political group whose most famous boss was William Tweed.

Tammany Hall

BONUS 18

Name these political parties and organizations FTPE.

10: Though Kennedy won Illinois by only 9,000 votes, he won Cook County by 450,000 thanks to this machine at the time led by Richard Daley.

Chicago machine (accept Cook County Democratic Organization)

10: This is the largest political party in Japan and holds an absolute majority in the House of Representatives.

Liberal Democratic Party (accept LDP)

10: This political movement was mainly made up of Republicans that supported the Democrat Grover Cleveland in the 1884 election.

Mugwumps

TOSSUP 19

His paintings mainly depict people in small towns even though he lived most of his life in New York City. The first of these paintings to appear in the magazine for which he was best known was titled "Boy with Baby Carriage." Others in 1916 included "Gramps at the Plate" and "Redhead Loves Hatty Perkins." However, he had many other famous paintings including portraits of four presidents, a series of "Rosie the Riveter" images, "The Four Freedoms," and "The Golden Rule." FTP name this American artist who painted covers for The Saturday Evening Post from 1916 to 1963.

Norman Rockwell

BONUS 19

For 5 for one, 10 for two, 20 for three, or 30 for all four, name the four freedoms Norman Rockwell painted that were originally in Franklin D. Roosevelt's 1941 State of the Union Address.

30:

**Freedom from want, freedom from fear, freedom of worship
(accept religion), freedom of speech**

TOSSUP 20

Its name in Greek means "up state". It is triggered when fully condensed sister chromatids are arranged into pairs by the spindle in the metaphase. Motor proteins play a vital role as they pull on the kinetochore microtubules to separate the chromatids to their respective spindle poles. FTP, name this penultimate stage of mitosis.

Anaphase

BONUS 20

FTPE, name these other phases of mitosis

10: This last stage of mitosis occurs after anaphase and cleaves the cell in half.

Telophase

10: Occurring right before anaphase, this stage is responsible for the converging of centromeres at the centre of the dividing cell.

Metaphase

10: This stage of the cell cycle is where the cell spends most of its life and is defined only by the absence of cell division.

Interphase