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Vocabulary Builder Reference from...

Fabio Pacucci: Newton's three-body problem explained | TED Talk

https://www.ted.com/talks/fabio_pacucci_newton_s_three_body_problem_explained

All Words

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Session 1: Word List

experiment

n. the scientific test conducted to observe what happens and gain new knowledge

synonym: experimentation, investigation

(1) **experiment** design, (2) series of **experiments**

His **experiments** showed highly positive results.

calculated

adj. done with careful thought or planning; deliberate and intentional; based on a process of reasoning or estimation rather than on instinct or chance

synonym: premeditated, willful, deliberate

(1) **calculated** bankruptcy, (2) **calculated** crime

The company made a **calculated** decision to invest in new technology.

planet

n. any of the nine large celestial bodies that circle in the solar system; any celestial body that revolves around a star

synonym: earth, world, globe

(1) **planet** like the Earth, (2) save the **planet**

Mercury is the closest **planet** to the sun.

numerical

adj. relating to, expressed, or denoted by a number

synonym: quantitative, numeral, mathematical

(1) 3D **numerical** simulation, (2) the **numerical** keypad
The **numerical** value of Pi is approximately 3.14.

simulate

v. to make a pretense of someone's behavior or looks; to reproduce something that exists in real life using computers, models, etc., usually for study or training purposes

synonym : pretend, imitate, mimic

(1) **simulate** climate change, (2) **simulate** a future scenario
He had painted the wood to **simulate** stone.

initial

adj. of or happening at the beginning; (noun) the first letter of a word, especially a person's name

synonym : basic, primary, beginning

(1) **initial** velocity, (2) an **initial** letter

They took the **initial** step toward reconciliation.

distance

n. the amount of space between two points, measured in units such as miles, meters, or kilometers; the extent, scope, or range between two things, such as distance or emotional distance

synonym : space, gap, span

(1) driving **distance**, (2) social **distance**

The marathon runner covered a long **distance** in a short amount of time.

mercury

n. a heavy, silvery-white metal that is liquid at room temperature and is used in thermometers, electrical equipment, and other devices; (Mercury) the smallest planet and the nearest to the sun

synonym : quicksilver, hydrargyrum, Hg

(1) **mercury** poisoning, (2) **Mercury** Plan

The **mercury** in the thermometer had risen to the boiling point.

modify

v. to change something slightly, such as a plan, option, law, etc., especially to make it more suitable for a

particular purpose

synonym : adjust, alter, revise

(1) genetically **modify** food, (2) **modify** my behavior

We use adverbs to **modify** verbs and adjectives.

shocking

adj. extremely or surprisingly bad, or causing a strong emotional response such as surprise or disgust

synonym : startling, surprising, astounding

(1) **shocking** response, (2) **shocking** revelation

The news of the accident was **shocking** and left many in shock.

orbit

n. the path of an object around a celestial body, especially a planet, star, or moon, under the influence of gravity.

synonym : path, course, trajectory

(1) the **orbit** of the moon, (2) a planetary **orbit**

The rocket engine is used to put the satellite into **orbit**.

drastic

adj. radical and extreme; likely to have a significant or far-reaching impact

synonym : extreme, fierce, radical

(1) **drastic** measures, (2) make **drastic** revision

The global community is undergoing **drastic** changes at present.

plunge

v. to dive quickly and steeply downward; to thrust or throw into something; (noun) a steep and rapid fall

synonym : dive, drop, thrust

(1) **plunge** into the water, (2) **plunge** a dagger through his heart

The company's profits **plunged** after the recall of their new product.

collide

v. to hit something violently when moving

synonym : clash, slam, contradict

(1) **collide** head-on, (2) **collide** in midair

The interests of the two countries **collide**.

destabilize

v. to cause something to become less stable or secure
synonym : unsettle, disrupt, upset

(1) **destabilize** the market, (2) **destabilize** a good relationship

The political crisis **destabilized** the country and caused widespread turmoil.

astonishing

adj. surprising or shocking; difficult to believe
synonym : surprising, shocking, astounding

(1) **astonishing** achievement, (2) make **astonishing** gains

The news of her sudden death was **astonishing** to everyone who knew her.

rev

n. a measure of the rate at which an engine or motor rotates, often expressed in revolutions per minute (RPM); (verb) to increase the number of rotations per minute

synonym : revolution, RPM, speed

(1) low- **rev** engine, (2) **rev** up the crowd

He stepped on the gas pedal, and the engine released a loud **rev**.

stable

adj. firm and steady; not easily moved, disturbed, or changed

synonym : sturdy, unmoving, durable

(1) in **stable** condition, (2) have a **stable** job

Relations between the two countries have been relatively **stable** due to the summit meeting.

astrophysics

n. the branch of physics concerned with the study of the properties and behavior of celestial objects and the physical processes that govern the behavior and evolution of the universe

(1) **astrophysics** research, (2) neutrino **astrophysics**

He was studying **astrophysics** in an attempt to understand the origins of the universe.

refer

v. to direct someone's attention, thoughts, or questions to another source or person; to mention, cite, or allude to something as evidence or support

synonym: cite, allude, mention

(1) **refer** to a book, (2) **refer** to a map

Please **refer** to the instruction manual for further assistance.

property

n. a thing or things that belong to someone

synonym: belongings, possessions, equity

(1) a man of **property**, (2) chemical **property**

He stood to inherit a million-dollar **property**.

gravitational

adj. relating to or caused by gravity (= the force that attracts objects towards one another)

synonym: weighty, heavy, earthbound

(1) **gravitational** energy, (2) **gravitational** waves

The **gravitational** force of the black hole was so strong that nothing, not even light, could escape.

equation

n. the act of regarding as equal; (mathematics) a statement that expresses the equality of two expressions by connecting them with the equals sign

(1) the **equation** of poverty with ignorance, (2) a chemical **equation**

In this class, you will learn how to solve quadratic **equations**.

predict

v. to state beforehand that something will happen in the future, mainly based on knowledge or experience

synonym: forecast, anticipate, foresee

(1) **predict** the future, (2) **predict** when she will arrive

It's notoriously challenging to **predict** birth rates.

gravitation

n. the force by which a celestial body, such as the Earth, pulls objects toward its center; the attraction between

two or more objects due to their mass

synonym : attraction, pull, gravity

(1) terrestrial **gravitation**, (2) universal **gravitation**

The force of **gravitation** keeps the planets in our solar system in orbit around the sun.

mass

n. a large amount of a substance with no definite shape or form; a large number of people or things grouped or crowded together

synonym : abundance, crowd, mob

(1) a **mass** of molten rock, (2) critical **mass**

The **mass** of people who do not own property is politically impotent.

analytical

adj. relating to or using analysis (= the process of breaking down a complex system or concept into smaller, simpler parts to understand it better), or able to analyze

synonym : investigative, logical, cogent

(1) **analytical** approach, (2) **analytical** ability

He is **analytical** and can break down complex problems into manageable parts.

formula

n. a group of symbols, letters, or numbers that represent a rule, law, or mathematical statement

synonym : expression, recipe, procedure

(1) structural **formula**, (2) a binomial **formula**

The teacher told the students to memorize the math **formula**.

variable

adj. likely to change or vary often; (noun) a symbol, like x or y, that is used in mathematical or logical expressions to represent a value that may be changed

synonym : erratic, inconsistent, irregular

(1) a **variable** species, (2) a dependent **variable**

Rainfall in the tropics is highly **variable**.

Newtonian

adj. relating to Sir Isaac Newton or his laws of motion and universal gravitation

synonym: classical, physics, mechanics

(1) **Newtonian** physics, (2) **Newtonian** mechanics

The motion of planets can be described using **Newtonian** mechanics.

mathematics

n. the science dealing with the logic of quantities, shapes, spaces, and arrangement

synonym: arithmetic, calculation, calculus

(1) a good grounding in **mathematics**, (2) **mathematics** competition

He has a flair for **mathematics**.

constraint

n. a limit or restriction on something, such as an action, behavior, or thought

synonym: limitation, restriction, bound

(1) **constraint** on business activity, (2) strict time **constraints**

The budget **constraint** forced them to make difficult decisions.

independence

n. freedom from another's or others' control or influence

synonym: freedom, liberty, autonomy

(1) financial **independence**, (2) **independence** ceremony

There is nothing more valuable than **independence** and freedom.

initially

adv. at the beginning; at first

synonym: originally, primarily, firstly

(1) **initially** anticipated, (2) diagnosed **initially** as a tumor

This train departed later than **initially** scheduled.

velocity

n. the rate of change of an object's position with respect to time, often measured in meters per second (m/s)

synonym: speed, rapidity, swiftness

(1) initial **velocity**, (2) high **velocity**

The **velocity** of the car was too fast for the road conditions.

relative

adj. considered and evaluated through comparison with something else

synonym : comparative, proximate, congeneric

(1) a remote **relative**, (2) **relative** factors

Most countries prohibit sexual activity between certain close **relatives**.

gravity

n. the force that attracts a body towards the center of the earth or towards any other physical body having mass; a manner that is solemn

synonym : heaviness, attraction, weight

(1) the attraction of **gravity**, (2) preserve my **gravity**

The astronaut felt weightless in space due to the absence of **gravity**.

solvable

adj. capable of being solved or resolved; able to be fixed or resolved with effort, skill, or knowledge

synonym : attainable, resolvable, achievable

(1) **solvable** problem, (2) mathematically **solvable** equation

The engineers found the technical glitch in the system was quite **solvable** with a software update.

messy

adj. disorganized and untidy

synonym : cluttered, disorganized, untidy

(1) **messy** data, (2) **messy** handling

His **messy** bedroom is always a source of frustration for his mother.

untangle

v. to separate or straighten out something that is tangled, confused, or complicated; to clarify or make sense of something difficult to understand or explain

synonym : disentangle, unravel, decipher

(1) **untangle** a situation, (2) **untangle** a problem

I need to **untangle** this knot before using this rope piece.

universe

n. everything that exists, especially all physical matter, including planets, stars, galaxies, and all other forms of

matter and energy

synonym: cosmos, macrocosm

(1) theory of the **universe**, (2) expansion of the **universe**
The **universe** is about 13.8 billion years old.

fling

v. to throw or push something or someone with force or recklessness, especially because you are angry

synonym: throw, dump, hurl

(1) **fling** a stream of abuse, (2) **fling** a door open forcefully
He was provoked to **fling** the draft on the floor.

apparent

adj. able to see or understand easily or clearly

synonym: obvious, clear, conspicuous

(1) heir **apparent**, (2) **apparent** contradiction
This star is **apparent** to the naked eye.

stability

n. the quality or attribute of being firm and steadfast

synonym: resilience, solidity, steadiness

(1) **stability** pact, (2) fiscal **stability** pact

The policy should increase the country's monetary **stability**.

improbable

adj. not likely to happen or be true; unlikely; having a low probability or chance of occurring

synonym: unlikely, doubtful, implausible

(1) **improbable** story, (2) **improbable** event

It is **improbable** that we will find a solution to this problem overnight.

configuration

n. the arrangement or pattern of something or a group of related things

synonym: arrangement, composition, formatting

(1) **configuration** of the system, (2) engine **configuration**

The **configuration** of molecules in steel changes significantly with temperature.

unpredictable

adj. not capable of being foreseen or calculated; not regular or certain

synonym : uncertain, variable, random

(1) dangerously **unpredictable** person, (2) **unpredictable** outcome

The weather in this region is often **unpredictable**, with sudden rainstorms and strong winds.

timescale

n. a period or interval of time, particularly one used as a standard for measuring or comparing other periods of time; a reference point or benchmark for the duration or length of a particular event or process

synonym : time frame, schedule, duration

(1) long- **timescale**, (2) realistic **timescale**

The **timescale** for completing the construction project is three years.

astronomical

adj. relating to astronomy or the study of celestial bodies and phenomena; very large or immense in scale or magnitude

synonym : huge, vast, enormous

(1) **astronomical** observation, (2) **astronomical** numbers

The cost of the new equipment was **astronomical** and beyond the company's budget.

outcome

n. the result or effect of an action, event, etc.

synonym : result, consequence, effect

(1) improved student **outcomes**, (2) a desirable **outcome**

They awaited news of the **outcome** of the election.

chaotic

adj. without any order or organization; extremely disorganized, unpredictable, and confusing

synonym : disorderly, cluttered, topsy-turvy

(1) the **chaotic** economic situation, (2) **chaotic** theory

Change is also occurring in Turkey as a result of **chaotic** reform.

physicist

n. a scientist who specializes in the field of physics

(1) talented **physicist**, (2) theoretical **physicist**

Einstein was an outstanding and famous **physicist** of the 20th century.

characteristic

n. a typical feature or quality that can identify, tell apart, or describe something or somebody

synonym: feature, quality, attribute

(1) stripes **characteristic** of the zebra, (2) my friend's **characteristic** laugh

Bananas have their **characteristic** taste and odor.

deterministic

adj. characterized by an assumption of cause and effect and the absence of chance or randomness, often used to describe scientific or engineering calculations

synonym: predictable, predetermined, certain

(1) **deterministic** approach, (2) **deterministic** system

The **deterministic** algorithm always produces the same result for a given input.

random

adj. made, done, or happening without method, conscious decision, or any regular pattern

synonym: incidental, arbitrary, unanticipated

(1) a **random** choice, (2) bombs fell at **random**

To find drunk drivers, police conduct **random** tests.

shove

v. to push someone or something in a rough way

synonym: push, jab, elbow

(1) **shove** a person aside, (2) **shove** hamburger into my mouth

He forcibly **shoved** the flyer into my bag.

bet

v. to risk money on the result of an event or a competition, such as a race or game, to get more money; to have faith or confidence in something

synonym: stake, wager, gamble

(1) **bet** on a race, (2) **bet** my future

I **bet** that you know it.

relevance

n. the state or degree of being closely connected or appropriate to the matter at hand

synonym: pertinence, applicability, connection

(1) have no **relevance**, (2) **relevance** category

The **relevance** of this information to the current situation needs to be investigated.

complicated

adj. involving a lot of different things or parts in a way that is difficult to understand or analyze

synonym: complex, convoluted, intricate

(1) a **complicated** process, (2) become increasingly **complicated**

He did **complicated** pen-and-ink drawings in just a few days.

precision

n. the quality or condition of being exact and accurate

synonym: accuracy, exactness, rigor

(1) a **precision** instrument, (2) speak with **precision**

This operation requires both patience and **precision**.

continuous

adj. occurring or existing without a pause or interruption

synonym: ceaseless, regular, repeated

(1) **continuous** improvement, (2) a **continuous** row of warehouses

The heavy snow has been **continuous** since last morning.

advancement

n. the development, improvement, or progress of something

synonym: progression, breakthrough, improvement

(1) **advancement** of knowledge, (2) career **advancement**
Competition between countries resulted in fast technological **advancement**.

catastrophe

n. a sudden event that causes extreme ruin and misfortune

synonym: disaster, calamity, cataclysm

(1) **catastrophe** risk management, (2) avoid climate **catastrophe**

The lack of funds has resulted in a **catastrophe** for our university system.

approximate

adj. nearly accurate or correct, but not completely so
synonym: rough, close, near

(1) linear **approximate** equation, (2) **approximate** time
The **approximate** cost of the project was estimated to be around \$500,000.

increasingly

adv. more and more
synonym: more and more, progressively

(1) **increasingly** become common, (2) face **increasingly** complicated challenges

Our company found it **increasingly** difficult to keep up with the competition.

process

n. a series of actions or operations performed to achieve a particular outcome or goal; a systematic procedure or approach used to accomplish a specific task or objective; a method of treating milk to make it suitable for consumption or use in other dairy products
synonym: procedure, method, system

(1) **process** improvement, (2) decision-making **process**
The **process** for applying for a visa can be lengthy and complicated.

confident

adj. feeling sure about your abilities or qualities or having trust in people, plans, or the future
synonym: certain, sure, convinced

(1) feel **confident**, (2) a **confident** remark
I'm not **confident** in our victory.

exert

v. to put forth effort; to put into action; to bring into play
synonym: exert, apply, use

(1) **exert** control, (2) **exert** influence
He **exerted** himself to lift the heavyweight.

restricted

adj. limited in extent, number, scope, or action, especially by official rules, laws, etc.

synonym: limited, determinate, fixed

(1) **restricted** area, (2) lactose **restricted** diet

The country has designated our products as **restricted** import goods.

asteroid

n. a small rocky body orbiting the sun, typically in the region between Mars and Jupiter

synonym: minor planet, planetoid, rocky planetesimal

(1) **asteroid** mining, (2) **asteroid** explorer

Scientists are studying the composition and origins of the **asteroid** belt to understand the early solar system better.

confidence

n. the feeling or attitude that one can trust or rely on the abilities or good qualities of someone or something

synonym: self-trust, certainty, belief

(1) **confidence** as a teacher, (2) boost my **confidence**

Skill and **confidence** are an unconquered army.

launch

v. to send or propel something into the air or space using a device such as a rocket, missile, or spacecraft; to make something available or on sale for the first time

synonym: start, initiate, begin

(1) **launch** a spaceship into orbit, (2) **launch** a big attack

The company is set to **launch** its new product line next month.

galaxy

n. an independent group of stars, interstellar gas, dark matter, etc., in the universe, bound together by gravity

synonym: star cluster, nebula, star system

(1) elliptic **galaxy**, (2) a **galaxy** of famous actors

The Milky Way **galaxy** has numerous water-bearing planets.

Session 2: Spelling

1. Ne_____an mechanics *adj.* relating to Sir Isaac Newton or his laws of motion and universal gravitation
2. engine con_____ion *n.* the arrangement or pattern of something or a group of related things
3. si_____te a future scenario *v.* to make a pretense of someone's behavior or looks; to reproduce something that exists in real life using computers, models, etc., usually for study or training purposes
4. driving di_____ce *n.* the amount of space between two points, measured in units such as miles, meters, or kilometers; the extent, scope, or range between two things, such as distance or emotional distance
5. critical m____s *n.* a large amount of a substance with no definite shape or form; a large number of people or things grouped or crowded together
6. low-r_v engine *n.* a measure of the rate at which an engine or motor rotates, often expressed in revolutions per minute (RPM); (verb) to increase the number of rotations per minute
7. con_____us improvement *adj.* occurring or existing without a pause or interruption
8. unp_____ble outcome *adj.* not capable of being foreseen or calculated; not regular or certain

ANSWERS: 1. Newtonian, 2. configuration, 3. simulate, 4. distance, 5. mass, 6. rev, 7. continuous, 8. unpredictable

9. sh__e hamburger into my mouth *v.* to push someone or something in a rough way
10. me____y poisoning *n.* a heavy, silvery-white metal that is liquid at room temperature and is used in thermometers, electrical equipment, and other devices; (Mercury) the smallest planet and the nearest to the sun
11. pr____s improvement *n.* a series of actions or operations performed to achieve a particular outcome or goal; a systematic procedure or approach used to accomplish a specific task or objective; a method of treating milk to make it suitable for consumption or use in other dairy products
12. chemical pr____ty *n.* a thing or things that belong to someone
13. det____tic approach *adj.* characterized by an assumption of cause and effect and the absence of chance or randomness, often used to describe scientific or engineering calculations
14. a com____ed process *adj.* involving a lot of different things or parts in a way that is difficult to understand or analyze
15. initial ve____ty *n.* the rate of change of an object's position with respect to time, often measured in meters per second (m/s)
16. a binomial fo____a *n.* a group of symbols, letters, or numbers that represent a rule, law, or mathematical statement

ANSWERS: 9. shove, 10. mercury, 11. process, 12. property, 13. deterministic, 14. complicated, 15. velocity, 16. formula

17. ast_____cal observation *adj.* relating to astronomy or the study of celestial bodies and phenomena; very large or immense in scale or magnitude
18. ch_____c theory *adj.* without any order or organization; extremely disorganized, unpredictable, and confusing
19. ast_____ng achievement *adj.* surprising or shocking; difficult to believe
20. adv_____nt of knowledge *n.* the development, improvement, or progress of something
21. co_____e head-on *v.* to hit something violently when moving
22. face inc_____gly complicated challenges *adv.* more and more
23. a planetary or__t *n.* the path of an object around a celestial body, especially a planet, star, or moon, under the influence of gravity.
24. 3D nu_____al simulation *adj.* relating to, expressed, or denoted by a number
25. ap_____nt contradiction *adj.* able to see or understand easily or clearly
26. become increasingly com_____ed *adj.* involving a lot of different things or parts in a way that is difficult to understand or analyze
27. series of exp_____nts *n.* the scientific test conducted to observe what happens and gain new knowledge
28. realistic ti_____le *n.* a period or interval of time, particularly one used as a standard for measuring or comparing other periods of time; a reference point or benchmark for the duration or length of a particular event or process

ANSWERS: 17. astronomical, 18. chaotic, 19. astonishing, 20. advancement, 21. collide, 22. increasingly, 23. orbit, 24. numerical, 25. apparent, 26. complicated, 27. experiment, 28. timescale

29. si_____te climate change *v.* to make a pretense of someone's behavior or looks; to reproduce something that exists in real life using computers, models, etc., usually for study or training purposes
30. structural fo_____a *n.* a group of symbols, letters, or numbers that represent a rule, law, or mathematical statement
31. me__y data *adj.* disorganized and untidy
32. lactose res_____ed diet *adj.* limited in extent, number, scope, or action, especially by official rules, laws, etc.
33. res_____ed area *adj.* limited in extent, number, scope, or action, especially by official rules, laws, etc.
34. des_____ze a good relationship *v.* to cause something to become less stable or secure
35. r_v up the crowd *n.* a measure of the rate at which an engine or motor rotates, often expressed in revolutions per minute (RPM); (verb) to increase the number of rotations per minute
36. inc_____gly become common *adv.* more and more
37. dangerously unp_____ble person *adj.* not capable of being foreseen or calculated; not regular or certain
38. pl___e into the water *v.* to dive quickly and steeply downward; to thrust or throw into something; (noun) a steep and rapid fall

ANSWERS: 29. simulate, 30. formula, 31. messy, 32. restricted, 33. restricted, 34. destabilize, 35. rev, 36. increasingly, 37. unpredictable, 38. plunge

39. app_____te time *adj.* nearly accurate or correct, but not completely so
40. the nu_____al keypad *adj.* relating to, expressed, or denoted by a number
41. a va_____le species *adj.* likely to change or vary often; (noun) a symbol, like x or y, that is used in mathematical or logical expressions to represent a value that may be changed
42. as_____id mining *n.* a small rocky body orbiting the sun, typically in the region between Mars and Jupiter
43. des_____ze the market *v.* to cause something to become less stable or secure
44. long-ti_____le *n.* a period or interval of time, particularly one used as a standard for measuring or comparing other periods of time; a reference point or benchmark for the duration or length of a particular event or process
45. speak with pr_____on *n.* the quality or condition of being exact and accurate
46. me__y handling *adj.* disorganized and untidy
47. Ne_____an physics *adj.* relating to Sir Isaac Newton or his laws of motion and universal gravitation
48. terrestrial gra_____on *n.* the force by which a celestial body, such as the Earth, pulls objects toward its center; the attraction between two or more objects due to their mass
49. theoretical ph_____st *n.* a scientist who specializes in the field of physics

ANSWERS: 39. approximate, 40. numerical, 41. variable, 42. asteroid, 43. destabilize, 44. timescale, 45. precision, 46. messy, 47. Newtonian, 48. gravitation, 49. physicist

50. cat_____he risk management *n.* a sudden event that causes extreme ruin and misfortune
51. pl___t like the Earth *n.* any of the nine large celestial bodies that circle in the solar system; any celestial body that revolves around a star
52. feel co_____nt *adj.* feeling sure about your abilities or qualities or having trust in people, plans, or the future
53. fl__g a stream of abuse *v.* to throw or push something or someone with force or recklessness, especially because you are angry
54. heir ap_____nt *adj.* able to see or understand easily or clearly
55. pr_____t when she will arrive *v.* to state beforehand that something will happen in the future, mainly based on knowledge or experience
56. the eq_____on of poverty with ignorance *n.* the act of regarding as equal; (mathematics) a statement that expresses the equality of two expressions by connecting them with the equals sign
57. a pr_____on instrument *n.* the quality or condition of being exact and accurate
58. sh_____ng revelation *adj.* extremely or surprisingly bad, or causing a strong emotional response such as surprise or disgust
59. a m__s of molten rock *n.* a large amount of a substance with no definite shape or form; a large number of people or things grouped or crowded together

ANSWERS: 50. catastrophe, 51. planet, 52. confident, 53. fling, 54. apparent, 55. predict, 56. equation, 57. precision, 58. shocking, 59. mass

60. re_____ce category *n.* the state or degree of being closely connected or appropriate to the matter at hand
61. high ve_____ty *n.* the rate of change of an object's position with respect to time, often measured in meters per second (m/s)
62. expansion of the un_____se *n.* everything that exists, especially all physical matter, including planets, stars, galaxies, and all other forms of matter and energy
63. stripes cha_____tic of the zebra *n.* a typical feature or quality that can identify, tell apart, or describe something or somebody
64. improved student ou_____es *n.* the result or effect of an action, event, etc.
65. talented ph_____st *n.* a scientist who specializes in the field of physics
66. neutrino ast_____ics *n.* the branch of physics concerned with the study of the properties and behavior of celestial objects and the physical processes that govern the behavior and evolution of the universe
67. theory of the un_____se *n.* everything that exists, especially all physical matter, including planets, stars, galaxies, and all other forms of matter and energy
68. so_____le problem *adj.* capable of being solved or resolved; able to be fixed or resolved with effort, skill, or knowledge

ANSWERS: 60. relevance, 61. velocity, 62. universe, 63. characteristic, 64. outcome, 65. physicist, 66. astrophysics, 67. universe, 68. solvable

69. the or__t of the moon *n.* the path of an object around a celestial body, especially a planet, star, or moon, under the influence of gravity.
70. diagnosed in_____ly as a tumor *adv.* at the beginning; at first
71. un_____le a situation *v.* to separate or straighten out something that is tangled, confused, or complicated; to clarify or make sense of something difficult to understand or explain
72. in_____l velocity *adj.* of or happening at the beginning; (noun) the first letter of a word, especially a person's name
73. mo___y my behavior *v.* to change something slightly, such as a plan, option, law, etc., especially to make it more suitable for a particular purpose
74. gra_____nal energy *adj.* relating to or caused by gravity (= the force that attracts objects towards one another)
75. social di_____ce *n.* the amount of space between two points, measured in units such as miles, meters, or kilometers; the extent, scope, or range between two things, such as distance or emotional distance
76. a ra___m choice *adj.* made, done, or happening without method, conscious decision, or any regular pattern
77. a man of pr_____ty *n.* a thing or things that belong to someone

ANSWERS: 69. orbit, 70. initially, 71. untangle, 72. initial, 73. modify, 74. gravitational, 75. distance, 76. random, 77. property

78. b_t on a race *v.* to risk money on the result of an event or a competition, such as a race or game, to get more money; to have faith or confidence in something
79. a chemical eq____on *n.* the act of regarding as equal; (mathematics) a statement that expresses the equality of two expressions by connecting them with the equals sign
80. make ast_____ng gains *adj.* surprising or shocking; difficult to believe
81. pr_____t the future *v.* to state beforehand that something will happen in the future, mainly based on knowledge or experience
82. in_____ly anticipated *adv.* at the beginning; at first
83. exp_____nt design *n.* the scientific test conducted to observe what happens and gain new knowledge
84. a desirable ou_____e *n.* the result or effect of an action, event, etc.
85. a ga___y of famous actors *n.* an independent group of stars, interstellar gas, dark matter, etc., in the universe, bound together by gravity
86. fl__g a door open forcefully *v.* to throw or push something or someone with force or recklessness, especially because you are angry
87. sh__e a person aside *v.* to push someone or something in a rough way
88. mat_____cs competition *n.* the science dealing with the logic of quantities, shapes, spaces, and arrangement

ANSWERS: 78. bet, 79. equation, 80. astonishing, 81. predict, 82. initially, 83. experiment, 84. outcome, 85. galaxy, 86. fling, 87. shove, 88. mathematics

89. ast_____cal numbers *adj.* relating to astronomy or the study of celestial bodies and phenomena; very large or immense in scale or magnitude
90. make dr_____c revision *adj.* radical and extreme; likely to have a significant or far-reaching impact
91. the attraction of gr_____y *n.* the force that attracts a body towards the center of the earth or towards any other physical body having mass; a manner that is solemn
92. a dependent va_____le *adj.* likely to change or vary often; (noun) a symbol, like x or y, that is used in mathematical or logical expressions to represent a value that may be changed
93. con_____nt on business activity *n.* a limit or restriction on something, such as an action, behavior, or thought
94. decision-making pr_____s *n.* a series of actions or operations performed to achieve a particular outcome or goal; a systematic procedure or approach used to accomplish a specific task or objective; a method of treating milk to make it suitable for consumption or use in other dairy products
95. an in_____l letter *adj.* of or happening at the beginning; (noun) the first letter of a word, especially a person's name
96. ex__t influence *v.* to put forth effort; to put into action; to bring into play
97. ana_____al approach *adj.* relating to or using analysis (= the process of breaking down a complex system or concept into smaller, simpler parts to understand it better), or able to analyze

ANSWERS: 89. astronomical, 90. drastic, 91. gravity, 92. variable, 93. constraint, 94. process, 95. initial, 96. exert, 97. analytical

98. strict time con_____nts *n.* a limit or restriction on something, such as an action, behavior, or thought
99. my friend's cha_____tic laugh *n.* a typical feature or quality that can identify, tell apart, or describe something or somebody
100. elliptic ga___y *n.* an independent group of stars, interstellar gas, dark matter, etc., in the universe, bound together by gravity
101. financial ind_____nce *n.* freedom from another's or others' control or influence
102. pl___e a dagger through his heart *v.* to dive quickly and steeply downward; to thrust or throw into something; (noun) a steep and rapid fall
103. dr_____c measures *adj.* radical and extreme; likely to have a significant or far-reaching impact
104. un_____le a problem *v.* to separate or straighten out something that is tangled, confused, or complicated; to clarify or make sense of something difficult to understand or explain
105. genetically mo___y food *v.* to change something slightly, such as a plan, option, law, etc., especially to make it more suitable for a particular purpose
106. co_____e in midair *v.* to hit something violently when moving
107. save the pl___t *n.* any of the nine large celestial bodies that circle in the solar system; any celestial body that revolves around a star

ANSWERS: 98. constraint, 99. characteristic, 100. galaxy, 101. independence, 102. plunge, 103. drastic, 104. untangle, 105. modify, 106. collide, 107. planet

108. a good grounding in mat_____cs *n.* the science dealing with the logic of quantities, shapes, spaces, and arrangement
109. imp_____le event *adj.* not likely to happen or be true; unlikely; having a low probability or chance of occurring
110. sh_____ng response *adj.* extremely or surprisingly bad, or causing a strong emotional response such as surprise or disgust
111. preserve my gr_____y *n.* the force that attracts a body towards the center of the earth or towards any other physical body having mass; a manner that is solemn
112. avoid climate cat_____he *n.* a sudden event that causes extreme ruin and misfortune
113. re_____ve factors *adj.* considered and evaluated through comparison with something else
114. la____h a spaceship into orbit *v.* to send or propel something into the air or space using a device such as a rocket, missile, or spacecraft; to make something available or on sale for the first time
115. imp_____le story *adj.* not likely to happen or be true; unlikely; having a low probability or chance of occurring
116. a con_____us row of warehouses *adj.* occurring or existing without a pause or interruption
117. ana_____al ability *adj.* relating to or using analysis (= the process of breaking down a complex system or concept into smaller, simpler parts to understand it better), or able to analyze

ANSWERS: 108. mathematics, 109. improbable, 110. shocking, 111. gravity, 112. catastrophe, 113. relative, 114. launch, 115. improbable, 116. continuous, 117. analytical

118. fiscal st_____ty pact *n.* the quality or attribute of being firm and steadfast
119. re__r to a book *v.* to direct someone's attention, thoughts, or questions to another source or person; to mention, cite, or allude to something as evidence or support
120. ind_____nce ceremony *n.* freedom from another's or others' control or influence
121. re__r to a map *v.* to direct someone's attention, thoughts, or questions to another source or person; to mention, cite, or allude to something as evidence or support
122. la___h a big attack *v.* to send or propel something into the air or space using a device such as a rocket, missile, or spacecraft; to make something available or on sale for the first time
123. have a st___e job *adj.* firm and steady; not easily moved, disturbed, or changed
124. st_____ty pact *n.* the quality or attribute of being firm and steadfast
125. con_____ion of the system *n.* the arrangement or pattern of something or a group of related things
126. linear app_____te equation *adj.* nearly accurate or correct, but not completely so
127. mathematically so_____le equation *adj.* capable of being solved or resolved; able to be fixed or resolved with effort, skill, or knowledge
128. bombs fell at ra___m *adj.* made, done, or happening without method, conscious decision, or any regular pattern

ANSWERS: 118. stability, 119. refer, 120. independence, 121. refer, 122. launch, 123. stable, 124. stability, 125. configuration, 126. approximate, 127. solvable, 128. random

129. b_t my future *v.* to risk money on the result of an event or a competition, such as a race or game, to get more money; to have faith or confidence in something
130. career adv_____nt *n.* the development, improvement, or progress of something
131. con_____ce as a teacher *n.* the feeling or attitude that one can trust or rely on the abilities or good qualities of someone or something
132. gra_____nal waves *adj.* relating to or caused by gravity (= the force that attracts objects towards one another)
133. boost my con_____ce *n.* the feeling or attitude that one can trust or rely on the abilities or good qualities of someone or something
134. ast_____ics research *n.* the branch of physics concerned with the study of the properties and behavior of celestial objects and the physical processes that govern the behavior and evolution of the universe
135. a remote re_____ve *adj.* considered and evaluated through comparison with something else
136. ex__t control *v.* to put forth effort; to put into action; to bring into play
137. universal gra_____on *n.* the force by which a celestial body, such as the Earth, pulls objects toward its center; the attraction between two or more objects due to their mass
138. det_____tic system *adj.* characterized by an assumption of cause and effect and the absence of chance or randomness, often used to describe scientific or engineering calculations

ANSWERS: 129. bet, 130. advancement, 131. confidence, 132. gravitational, 133. confidence, 134. astrophysics, 135. relative, 136. exert, 137. gravitation, 138. deterministic

139. in st___e condition *adj.* firm and steady; not easily moved, disturbed, or changed
140. cal_____ed crime *adj.* done with careful thought or planning; deliberate and intentional; based on a process of reasoning or estimation rather than on instinct or chance
141. have no re_____ce *n.* the state or degree of being closely connected or appropriate to the matter at hand
142. Me_____y Plan *n.* a heavy, silvery-white metal that is liquid at room temperature and is used in thermometers, electrical equipment, and other devices; (Mercury) the smallest planet and the nearest to the sun
143. cal_____ed bankruptcy *adj.* done with careful thought or planning; deliberate and intentional; based on a process of reasoning or estimation rather than on instinct or chance
144. the ch_____c economic situation *adj.* without any order or organization; extremely disorganized, unpredictable, and confusing
145. as_____id explorer *n.* a small rocky body orbiting the sun, typically in the region between Mars and Jupiter
146. a co_____nt remark *adj.* feeling sure about your abilities or qualities or having trust in people, plans, or the future

ANSWERS: 139. stable, 140. calculated, 141. relevance, 142. mercury, 143. calculated, 144. chaotic, 145. asteroid, 146. confident

Session 3: Fill in the Blanks

1. The _____ cost of the project was estimated to be around \$500,000.
adj. nearly accurate or correct, but not completely so
2. Skill and _____ are an unconquered army.
n. the feeling or attitude that one can trust or rely on the abilities or good qualities of someone or something
3. In this class, you will learn how to solve quadratic _____.
n. the act of regarding as equal; (mathematics) a statement that expresses the equality of two expressions by connecting them with the equals sign
4. It is _____ that we will find a solution to this problem overnight.
adj. not likely to happen or be true; unlikely; having a low probability or chance of occurring
5. The _____ is about 13.8 billion years old.
n. everything that exists, especially all physical matter, including planets, stars, galaxies, and all other forms of matter and energy
6. Competition between countries resulted in fast technological _____.
n. the development, improvement, or progress of something
7. This star is _____ to the naked eye.
adj. able to see or understand easily or clearly
8. The rocket engine is used to put the satellite into _____.
n. the path of an object around a celestial body, especially a planet, star, or moon, under the influence of gravity.

ANSWERS: 1. approximate, 2. confidence, 3. equations, 4. improbable, 5. universe, 6. advancement, 7. apparent, 8. orbit

9. The _____ of this information to the current situation needs to be investigated.
- n.* the state or degree of being closely connected or appropriate to the matter at hand
10. The _____ force of the black hole was so strong that nothing, not even light, could escape.
- adj.* relating to or caused by gravity (= the force that attracts objects towards one another)
11. The budget _____ forced them to make difficult decisions.
- n.* a limit or restriction on something, such as an action, behavior, or thought
12. This train departed later than _____ scheduled.
- adv.* at the beginning; at first
13. He was studying _____ in an attempt to understand the origins of the universe.
- n.* the branch of physics concerned with the study of the properties and behavior of celestial objects and the physical processes that govern the behavior and evolution of the universe
14. He had painted the wood to _____ stone.
- v.* to make a pretense of someone's behavior or looks; to reproduce something that exists in real life using computers, models, etc., usually for study or training purposes
15. The company is set to _____ its new product line next month.
- v.* to send or propel something into the air or space using a device such as a rocket, missile, or spacecraft; to make something available or on sale for the first time

ANSWERS: 9. relevance, 10. gravitational, 11. constraint, 12. initially, 13. astrophysics, 14. simulate, 15. launch

16. The policy should increase the country's monetary _____.

n. the quality or attribute of being firm and steadfast

17. The teacher told the students to memorize the math _____.

n. a group of symbols, letters, or numbers that represent a rule, law, or mathematical statement

18. Change is also occurring in Turkey as a result of _____ reform.

adj. without any order or organization; extremely disorganized, unpredictable, and confusing

19. He is _____ and can break down complex problems into manageable parts.

adj. relating to or using analysis (= the process of breaking down a complex system or concept into smaller, simpler parts to understand it better), or able to analyze

20. The cost of the new equipment was _____ and beyond the company's budget.

adj. relating to astronomy or the study of celestial bodies and phenomena; very large or immense in scale or magnitude

21. Rainfall in the tropics is highly _____.

adj. likely to change or vary often; (noun) a symbol, like x or y, that is used in mathematical or logical expressions to represent a value that may be changed

22. The _____ algorithm always produces the same result for a given input.

adj. characterized by an assumption of cause and effect and the absence of chance or randomness, often used to describe scientific or engineering calculations

ANSWERS: 16. stability, 17. formula, 18. chaotic, 19. analytical, 20. astronomical, 21. variable, 22. deterministic

23. The news of her sudden death was _____ to everyone who knew her.
adj. surprising or shocking; difficult to believe
24. I need to _____ this knot before using this rope piece.
v. to separate or straighten out something that is tangled, confused, or complicated; to clarify or make sense of something difficult to understand or explain
25. I'm not _____ in our victory.
adj. feeling sure about your abilities or qualities or having trust in people, plans, or the future
26. He forcibly _____ the flyer into my bag.
v. to push someone or something in a rough way
27. Bananas have their _____ taste and odor.
n. a typical feature or quality that can identify, tell apart, or describe something or somebody
28. The motion of planets can be described using _____ mechanics.
adj. relating to Sir Isaac Newton or his laws of motion and universal gravitation
29. The force of _____ keeps the planets in our solar system in orbit around the sun.
n. the force by which a celestial body, such as the Earth, pulls objects toward its center; the attraction between two or more objects due to their mass
30. The political crisis _____ the country and caused widespread turmoil.
v. to cause something to become less stable or secure

ANSWERS: 23. astonishing, 24. untangle, 25. confident, 26. shoved, 27. characteristic, 28. Newtonian, 29. gravitation, 30. destabilized

31. They took the _____ step toward reconciliation.

adj. of or happening at the beginning; (noun) the first letter of a word, especially a person's name

32. They awaited news of the _____ of the election.

n. the result or effect of an action, event, etc.

33. He stood to inherit a million-dollar _____.

n. a thing or things that belong to someone

34. The _____ of people who do not own property is politically impotent.

n. a large amount of a substance with no definite shape or form; a large number of people or things grouped or crowded together

35. The weather in this region is often _____ with sudden rainstorms and strong winds.

adj. not capable of being foreseen or calculated; not regular or certain

36. The astronaut felt weightless in space due to the absence of _____.

n. the force that attracts a body towards the center of the earth or towards any other physical body having mass; a manner that is solemn

37. I _____ that you know it.

v. to risk money on the result of an event or a competition, such as a race or game, to get more money; to have faith or confidence in something

38. The _____ of the car was too fast for the road conditions.

n. the rate of change of an object's position with respect to time, often measured in meters per second (m/s)

ANSWERS: 31. initial, 32. outcome, 33. property, 34. mass, 35. unpredictable, 36. gravity, 37. bet, 38. velocity

39. He stepped on the gas pedal, and the engine released a loud ____.
- n.* a measure of the rate at which an engine or motor rotates, often expressed in revolutions per minute (RPM); (verb) to increase the number of rotations per minute
40. He has a flair for _____.
- n.* the science dealing with the logic of quantities, shapes, spaces, and arrangement
41. The heavy snow has been _____ since last morning.
- adj.* occurring or existing without a pause or interruption
42. He was provoked to _____ the draft on the floor.
- v.* to throw or push something or someone with force or recklessness, especially because you are angry
43. The _____ value of Pi is approximately 3.14.
- adj.* relating to, expressed, or denoted by a number
44. He did _____ pen-and-ink drawings in just a few days.
- adj.* involving a lot of different things or parts in a way that is difficult to understand or analyze
45. The _____ in the thermometer had risen to the boiling point.
- n.* a heavy, silvery-white metal that is liquid at room temperature and is used in thermometers, electrical equipment, and other devices; (Mercury) the smallest planet and the nearest to the sun
46. To find drunk drivers, police conduct _____ tests.
- adj.* made, done, or happening without method, conscious decision, or any regular pattern

ANSWERS: 39. rev, 40. mathematics, 41. continuous, 42. fling, 43. numerical, 44. complicated, 45. mercury, 46. random

47. The country has designated our products as _____ import goods.
adj. limited in extent, number, scope, or action, especially by official rules, laws, etc.
48. His _____ showed highly positive results.
n. the scientific test conducted to observe what happens and gain new knowledge
49. We use adverbs to _____ verbs and adjectives.
v. to change something slightly, such as a plan, option, law, etc., especially to make it more suitable for a particular purpose
50. The _____ for completing the construction project is three years.
n. a period or interval of time, particularly one used as a standard for measuring or comparing other periods of time; a reference point or benchmark for the duration or length of a particular event or process
51. The _____ of molecules in steel changes significantly with temperature.
n. the arrangement or pattern of something or a group of related things
52. Einstein was an outstanding and famous _____ of the 20th century.
n. a scientist who specializes in the field of physics
53. Please _____ to the instruction manual for further assistance.
v. to direct someone's attention, thoughts, or questions to another source or person; to mention, cite, or allude to something as evidence or support
54. The marathon runner covered a long _____ in a short amount of time.
n. the amount of space between two points, measured in units such as miles, meters, or kilometers; the extent, scope, or range between two things, such as distance or emotional distance

ANSWERS: 47. restricted, 48. experiments, 49. modify, 50. timescale, 51. configuration, 52. physicist, 53. refer, 54. distance

55. Our company found it _____ difficult to keep up with the competition.

adv. more and more

56. It's notoriously challenging to _____ birth rates.

v. to state beforehand that something will happen in the future, mainly based on knowledge or experience

57. The global community is undergoing _____ changes at present.

adj. radical and extreme; likely to have a significant or far-reaching impact

58. This operation requires both patience and _____.

n. the quality or condition of being exact and accurate

59. There is nothing more valuable than _____ and freedom.

n. freedom from another's or others' control or influence

60. Relations between the two countries have been relatively _____ due to the summit meeting.

adj. firm and steady; not easily moved, disturbed, or changed

61. His _____ bedroom is always a source of frustration for his mother.

adj. disorganized and untidy

62. Most countries prohibit sexual activity between certain close _____.

adj. considered and evaluated through comparison with something else

63. The company made a _____ decision to invest in new technology.

adj. done with careful thought or planning; deliberate and intentional; based on a process of reasoning or estimation rather than on instinct or chance

ANSWERS: 55. increasingly, 56. predict, 57. drastic, 58. precision, 59. independence, 60. stable, 61. messy, 62. relatives, 63. calculated

64. The interests of the two countries _____.
- v.* to hit something violently when moving
65. The _____ for applying for a visa can be lengthy and complicated.
- n.* a series of actions or operations performed to achieve a particular outcome or goal; a systematic procedure or approach used to accomplish a specific task or objective; a method of treating milk to make it suitable for consumption or use in other dairy products
66. Mercury is the closest _____ to the sun.
- n.* any of the nine large celestial bodies that circle in the solar system; any celestial body that revolves around a star
67. The engineers found the technical glitch in the system was quite _____ with a software update.
- adj.* capable of being solved or resolved; able to be fixed or resolved with effort, skill, or knowledge
68. The Milky Way _____ has numerous water-bearing planets.
- n.* an independent group of stars, interstellar gas, dark matter, etc., in the universe, bound together by gravity
69. The lack of funds has resulted in a _____ for our university system.
- n.* a sudden event that causes extreme ruin and misfortune
70. The news of the accident was _____ and left many in shock.
- adj.* extremely or surprisingly bad, or causing a strong emotional response such as surprise or disgust
71. Scientists are studying the composition and origins of the _____ belt to understand the early solar system better.
- n.* a small rocky body orbiting the sun, typically in the region between Mars and Jupiter

ANSWERS: 64. collide, 65. process, 66. planet, 67. solvable, 68. galaxy, 69. catastrophe, 70. shocking, 71. asteroid

72. He _____ himself to lift the heavyweight.

v. to put forth effort; to put into action; to bring into play

73. The company's profits _____ after the recall of their new product.

v. to dive quickly and steeply downward; to thrust or throw into something; (noun)
a steep and rapid fall

ANSWERS: 72. exerted, 73. plunged