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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

Advanced Words Only

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Session 1: Word List

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**.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

Session 2: Spelling

1. ast_____cal numbers *adj.* relating to astronomy or the study of celestial bodies and phenomena; very large or immense in scale or magnitude
2. ex__t influence *v.* to put forth effort; to put into action; to bring into play
3. co_____e in midair *v.* to hit something violently when moving
4. 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
5. cat_____he risk management *n.* a sudden event that causes extreme ruin and misfortune
6. des_____ze a good relationship *v.* to cause something to become less stable or secure
7. so_____le problem *adj.* capable of being solved or resolved; able to be fixed or resolved with effort, skill, or knowledge
8. imp_____le story *adj.* not likely to happen or be true; unlikely; having a low probability or chance of occurring
9. mathematically so_____le equation *adj.* capable of being solved or resolved; able to be fixed or resolved with effort, skill, or knowledge
10. theoretical ph_____st *n.* a scientist who specializes in the field of physics
11. avoid climate cat_____he *n.* a sudden event that causes extreme ruin and misfortune

ANSWERS: 1. astronomical, 2. exert, 3. collide, 4. plunge, 5. catastrophe, 6. destabilize, 7. solvable, 8. improbable, 9. solvable, 10. physicist, 11. catastrophe

12. 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
13. make dr_____c revision *adj.* radical and extreme; likely to have a significant or far-reaching impact
14. Ne_____an physics *adj.* relating to Sir Isaac Newton or his laws of motion and universal gravitation
15. fl__g a stream of abuse *v.* to throw or push something or someone with force or recklessness, especially because you are angry
16. talented ph_____st *n.* a scientist who specializes in the field of physics
17. Ne_____an mechanics *adj.* relating to Sir Isaac Newton or his laws of motion and universal gravitation
18. 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
19. 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
20. gra_____nal energy *adj.* relating to or caused by gravity (= the force that attracts objects towards one another)

ANSWERS: 12. untangle, 13. drastic, 14. Newtonian, 15. fling, 16. physicist, 17. Newtonian, 18. timescale, 19. rev, 20. gravitational

21. des_____ze the market *v.* to cause something to become less stable or secure
22. 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
23. gra_____nal waves *adj.* relating to or caused by gravity (= the force that attracts objects towards one another)
24. as_____id explorer *n.* a small rocky body orbiting the sun, typically in the region between Mars and Jupiter
25. 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
26. sh__e a person aside *v.* to push someone or something in a rough way
27. ast_____cal observation *adj.* relating to astronomy or the study of celestial bodies and phenomena; very large or immense in scale or magnitude
28. 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
29. ex__t control *v.* to put forth effort; to put into action; to bring into play

ANSWERS: 21. destabilize, 22. timescale, 23. gravitational, 24. asteroid, 25. deterministic, 26. shove, 27. astronomical, 28. gravitation, 29. exert

30. make ast_____ng gains *adj.* surprising or shocking; difficult to believe
31. fl__g a door open forcefully *v.* to throw or push something or someone with force or recklessness, especially because you are angry
32. ast_____ng achievement *adj.* surprising or shocking; difficult to believe
33. co_____e head-on *v.* to hit something violently when moving
34. imp_____le event *adj.* not likely to happen or be true; unlikely; having a low probability or chance of occurring
35. sh__e hamburger into my mouth *v.* to push someone or something in a rough way
36. 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
37. 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
38. the ch_____c economic situation *adj.* without any order or organization; extremely disorganized, unpredictable, and confusing
39. ch_____c theory *adj.* without any order or organization; extremely disorganized, unpredictable, and confusing

ANSWERS: 30. astonishing, 31. fling, 32. astonishing, 33. collide, 34. improbable, 35. shove, 36. untangle, 37. astrophysics, 38. chaotic, 39. chaotic

40. pl___e into the water
v. to dive quickly and steeply downward; to thrust or throw into something; (noun) a steep and rapid fall
41. 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
42. 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
43. as_____id mining
n. a small rocky body orbiting the sun, typically in the region between Mars and Jupiter
44. dr_____c measures
adj. radical and extreme; likely to have a significant or far-reaching impact
45. 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
46. 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

ANSWERS: 40. plunge, 41. deterministic, 42. gravitation, 43. asteroid, 44. drastic, 45. astrophysics, 46. rev

Session 3: Fill in the Blanks

1. 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
2. Einstein was an outstanding and famous _____ of the 20th century.
n. a scientist who specializes in the field of physics
3. 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
4. The global community is undergoing _____ changes at present.
adj. radical and extreme; likely to have a significant or far-reaching impact
5. He forcibly _____ the flyer into my bag.
v. to push someone or something in a rough way
6. The motion of planets can be described using _____ mechanics.
adj. relating to Sir Isaac Newton or his laws of motion and universal gravitation
7. 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: 1. asteroid, 2. physicist, 3. gravitation, 4. drastic, 5. shoved, 6. Newtonian, 7. deterministic

8. 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
9. 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
10. 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
11. 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)
12. 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
13. The lack of funds has resulted in a _____ for our university system.
n. a sudden event that causes extreme ruin and misfortune
14. Change is also occurring in Turkey as a result of _____ reform.
adj. without any order or organization; extremely disorganized, unpredictable, and confusing

ANSWERS: 8. improbable, 9. astronomical, 10. timescale, 11. gravitational, 12. untangle, 13. catastrophe, 14. chaotic

15. The political crisis _____ the country and caused widespread turmoil.
v. to cause something to become less stable or secure
16. 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
17. 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
18. He _____ himself to lift the heavyweight.
v. to put forth effort; to put into action; to bring into play
19. 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
20. 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
21. The interests of the two countries _____.
v. to hit something violently when moving
22. 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

ANSWERS: 15. destabilized, 16. plunged, 17. rev, 18. exerted, 19. fling, 20. solvable, 21. collide, 22. astrophysics

23. The news of her sudden death was _____ to everyone who knew her.
adj. surprising or shocking; difficult to believe

ANSWERS: 23. astonishing