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Bill Shillito: How to organize, add and multiply matrices | TED Talk

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

All Words

IMPORTANT

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Session 1: Word List

numb

adj. unable to feel physical sensation and movement; not showing human feeling or sensitivity

synonym : dazed, insensitive, emotionless

(1) **numb** with cold, (2) a **numb** mind

My left arm became **numb**.

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**.

ancient

adj. relating to the long ago, particularly the historical period preceding the fall of the Western Roman Empire; very old

synonym : archaic, age-old, obsolete

(1) pre-Christian **ancient**, (2) **ancient** stories

They have been living near water since **ancient** times.

represent

v. to speak, act, or be present on behalf of another person or group; to form or constitute

synonym : depict, express, describe

(1) **represent** by a diagram, (2) the characters that **represent** numbers

We elected him to **represent** us at the international conference.

array

n. a large group or collection of things or people, especially one that is impressive or attractive

synonym : collection, display, batch

(1) a two-dimensional **array**, (2) an **array** of troops

The customer on the Internet has to choose one from a formidable **array** of products.

nowadays

adv. at the current time, in comparison to the past

synonym : currently, presently, today

(1) young people **nowadays**, (2) not to be seen **nowadays**

People can clone a sheep **nowadays**.

matrix

n. a rectangular array of numbers, symbols, or expressions, arranged in rows and columns and often enclosed in brackets; an enclosure within which something originates or develops

synonym : grid, cast, table

(1) the **matrix** of Western civilization, (2) **matrix** multiplication

The **matrix** of numbers on the spreadsheet allowed the accountant to track the company's profits and losses easily.

economics

n. the branch of social science that deals with the production, consumption, and transfer of goods and services

synonym : social science, finance, business

(1) welfare **economics**, (2) **economics** professor

His class will cover an introduction to agricultural **economics**.

cryptography

n. the study of the techniques and methods used for secure communication and information processing, particularly using codes and ciphers

synonym: coding, steganography, encryption

(1) asymmetric **cryptology**, (2) digital **cryptology**

The software engineers developed a new **cryptology** algorithm to protect users' data.

physics

n. the science of matter and energy and their interactions

(1) nuclear **physics**, (2) laws of **physics**

He studied the **physics** of radiation.

electronics

n. the branch of physics and technology that deals with the behavior and control of electrons and the use of electronic devices and systems

synonym: technology, gadgets, circuitry

(1) **electronics** industry, (2) **electronics** store

The company specializes in manufacturing and selling cutting-edge **electronics**.

graphics

n. images, designs, or drawings used in websites, books, magazines, etc.

synonym: drawings, illustrations, pictures

(1) computer **graphics**, (2) **graphics** engine

My dream is to become a great **graphics** designer like her.

subtract

v. to take away or deduct a quantity or amount from a total; to remove or eliminate something from a larger whole

synonym: deduct, take away, remove

(1) **subtract** numbers, (2) **subtract** one from the total

I need to **subtract** the cost of my expenses from my income to see how much money I have left.

multiply

v. to add a number to itself a specified number of times; to increase or cause to increase very much in number or quantity

synonym: boost, amplify, reproduce

(1) **multiply** 5 and 6, (2) **multiply** about hundredfold

Multiply a number by itself twice.

divide

v. to separate or cause to separate into parts or groups

synonym: separate, disconnect, split

(1) **divide** the cake into two pieces, (2) **divide** money equally

Can you **divide** 123321 by eleven?

corresponding

adj. similar to, connected with, or accompanying something, especially in position or purpose

synonym: matching, equivalent, analogous

(1) find a **corresponding** lack, (2) the **corresponding** word in Spanish

The **corresponding** number on the dial was 3.

intuitive

adj. obtained through feelings rather than facts or proof

synonym: involuntary, instinctive, innate

(1) **intuitive** eating, (2) **intuitive** judgment

I had an **intuitive** feeling that I might be pregnant.

scalar

n. a quantity in physics or mathematics defined only by its magnitude and not by direction or orientation, which are represented by a single numerical value, such as temperature or speed

synonym: scalar, magnitude, quantity

(1) **scalar** product, (2) **scalar** field

The **scalar** quantity of distance represents only magnitude without considering direction.

unique

adj. being the only one of its kind; unlike anything else

synonym: one-of-a-kind, unparalleled, incomparable

(1) a **unique** teacher, (2) **unique** design

The painting is **unique**, and there is no other like it.

row

n. an arrangement of objects or people side by side in a line; (verb) to propel a boat through the water using oars

synonym: line, sequence, layer

(1) criminal on death **row**, (2) a **row** of cherry trees

He was the leader of the demonstrators and spoke out against the war in the front **row**.

column

n. one of the vertical blocks that split content on a page or screen from top to bottom; an upright pillar that often supports an arch, entablature, or other structure or stands alone as a monument

synonym: line, pillar, cue

(1) the spinal **column**, (2) a **column** of water

The newspaper devoted several **columns** to the affair.

writ

n. a written legal order or command

synonym: legal document, order, legal process

(1) a **writ** of summons, (2) issue a **writ**

He was served with a **writ** of eviction, giving him the notice to vacate the property.

translate

v. to convert or change words into another language

synonym: convert, transcribe, render

(1) **translate** a document into English, (2) **translate** the emotion to a movement

Translate the text from Italian into English.

grid

n. a pattern of regularly spaced horizontal and vertical lines; a system of high tension cables by which electrical power is distributed throughout a region

synonym: gridiron, battery grid, power system

(1) a **grid** design, (2) a wire **grid**

Grid pattern roads often appear in urban areas.

addition

n. the act or process of adding something to something else; the process of adding numbers

synonym: accumulation, expansion, addendum

(1) chemical **addition**, (2) **addition** of vectors

In **addition**, private corporations provide healthcare services.

dimension

n. a measurable extent of a particular kind, such as width, height, or length

synonym: extent, measurement, size

(1) new **dimension**, (2) the crosswise **dimension**

Overall **dimensions** are approximately 400x200mm.

encrypt

v. to convert information or data into a code, thereby making it unreadable without a key or password; to conceal or obscure information in a way that makes it inaccessible to unauthorized persons

synonym: encode, cipher, scramble

(1) **encrypt** data, (2) **encrypt** message

To protect their sensitive information, many businesses **encrypt** their files.

encode

v. to convert information into a code or format suitable for storage or transmission

synonym: transcribe, convert

(1) **encode** data, (2) **encode** information

The software can **encode** and decode encrypted messages.

decode

v. to convert something, such as a message or piece of information, from a specific form into one that you can understand

synonym: decipher, translate, interpret

(1) **decode** a message, (2) ability to **decode** the differences

The software could **decode** the encrypted data and reveal the hidden information.

branch

n. a division of a tree or woody shrub that grows out from the trunk or a main stem; a division of some larger or more complex organization

synonym: limb, twig, bough

(1) **branch** office, (2) a **branch** pipe

The **branch** of the tree had fallen and blocked the road.

constantly

adv. all the time

synonym : continuously, always, frequently

(1) a **constantly** innovative enterprise, (2) a **constantly** varying mind

The mobile application industry is **constantly** changing.

linear

adj. of, relating to, or consisting of lines or length; able to be expressed as a straight line, especially on a graph

synonym : straight, direct, right

(1) **linear** trend, (2) a **linear** equation

People tend to make **linear** predictions.

algebra

n. a type of mathematics in which signs and letters represent numbers

synonym : calculus

(1) **algebra** calculation, (2) strong in **algebra**

His classmates were laboring with advanced **algebra**.

awesome

adj. inspiring fear, admiration, or respect; very good, nice, fun, etc.

synonym : miraculous, marvelous, astounding

(1) **awesome** mental faculty, (2) have an **awesome** birthday

There is a lot of **awesome** nature and food in Hawaii.

Session 2: Spelling

- | | |
|--------------------------------|---|
| 1. a two-dimensional ar__y | <i>n.</i> a large group or collection of things or people, especially one that is impressive or attractive |
| 2. chemical ad____on | <i>n.</i> the act or process of adding something to something else; the process of adding numbers |
| 3. sc____r product | <i>n.</i> a quantity in physics or mathematics defined only by its magnitude and not by direction or orientation, which are represented by a single numerical value, such as temperature or speed |
| 4. mu____ly about hundredfold | <i>v.</i> to add a number to itself a specified number of times; to increase or cause to increase very much in number or quantity |
| 5. find a cor_____ing lack | <i>adj.</i> similar to, connected with, or accompanying something, especially in position or purpose |
| 6. digital cry_____phy | <i>n.</i> the study of the techniques and methods used for secure communication and information processing, particularly using codes and ciphers |
| 7. li____r trend | <i>adj.</i> of, relating to, or consisting of lines or length; able to be expressed as a straight line, especially on a graph |
| 8. su____ct one from the total | <i>v.</i> to take away or deduct a quantity or amount from a total; to remove or eliminate something from a larger whole |

ANSWERS: 1. array, 2. addition, 3. scalar, 4. multiply, 5. corresponding, 6. cryptography, 7. linear, 8. subtract

9. a li___r equation *adj.* of, relating to, or consisting of lines or length; able to be expressed as a straight line, especially on a graph
10. the spinal co___n *n.* one of the vertical blocks that split content on a page or screen from top to bottom; an upright pillar that often supports an arch, entablature, or other structure or stands alone as a monument
11. nuclear ph____s *n.* the science of matter and energy and their interactions
12. al____a calculation *n.* a type of mathematics in which signs and letters represent numbers
13. the crosswise di____on *n.* a measurable extent of a particular kind, such as width, height, or length
14. mu____ly 5 and 6 *v.* to add a number to itself a specified number of times; to increase or cause to increase very much in number or quantity
15. the ma___x of Western civilization *n.* a rectangular array of numbers, symbols, or expressions, arranged in rows and columns and often enclosed in brackets; an enclosure within which something originates or develops
16. pre-Christian an____t *adj.* relating to the long ago, particularly the historical period preceding the fall of the Western Roman Empire; very old
17. ability to de___e the differences *v.* to convert something, such as a message or piece of information, from a specific form into one that you can understand

ANSWERS: 9. linear, 10. column, 11. physics, 12. algebra, 13. dimension, 14. multiply, 15. matrix, 16. ancient, 17. decode

18. di___e the cake into two pieces *v.* to separate or cause to separate into parts or groups
19. a co___n of water *n.* one of the vertical blocks that split content on a page or screen from top to bottom; an upright pillar that often supports an arch, entablature, or other structure or stands alone as a monument
20. a un___e teacher *adj.* being the only one of its kind; unlike anything else
21. di___e money equally *v.* to separate or cause to separate into parts or groups
22. br___h office *n.* a division of a tree or woody shrub that grows out from the trunk or a main stem; a division of some larger or more complex organization
23. asymmetric cry_____phy *n.* the study of the techniques and methods used for secure communication and information processing, particularly using codes and ciphers
24. welfare ec_____cs *n.* the branch of social science that deals with the production, consumption, and transfer of goods and services
25. re_____nt by a diagram *v.* to speak, act, or be present on behalf of another person or group; to form or constitute
26. a con_____ly innovative enterprise *adv.* all the time
27. de___e a message *v.* to convert something, such as a message or piece of information, from a specific form into one that you can understand

ANSWERS: 18. divide, 19. column, 20. unique, 21. divide, 22. branch, 23. cryptography, 24. economics, 25. represent, 26. constantly, 27. decode

28. en___e information *v.* to convert information into a code or format suitable for storage or transmission
29. en_____t message *v.* to convert information or data into a code, thereby making it unreadable without a key or password; to conceal or obscure information in a way that makes it inaccessible to unauthorized persons
30. un___e design *adj.* being the only one of its kind; unlike anything else
31. computer gr_____cs *n.* images, designs, or drawings used in websites, books, magazines, etc.
32. aw_____e mental faculty *adj.* inspiring fear, admiration, or respect; very good, nice, fun, etc.
33. n__b with cold *adj.* unable to feel physical sensation and movement; not showing human feeling or sensitivity
34. a wire g__d *n.* a pattern of regularly spaced horizontal and vertical lines; a system of high tension cables by which electrical power is distributed throughout a region
35. su_____ct numbers *v.* to take away or deduct a quantity or amount from a total; to remove or eliminate something from a larger whole
36. tr_____te a document into English *v.* to convert or change words into another language
37. en_____t data *v.* to convert information or data into a code, thereby making it unreadable without a key or password; to conceal or obscure information in a way that makes it inaccessible to unauthorized persons

ANSWERS: 28. encode, 29. encrypt, 30. unique, 31. graphics, 32. awesome, 33. numb, 34. grid, 35. subtract, 36. translate, 37. encrypt

38. new di_____on *n.* a measurable extent of a particular kind, such as width, height, or length
39. strong in al_____a *n.* a type of mathematics in which signs and letters represent numbers
40. young people no_____ys *adv.* at the current time, in comparison to the past
41. ma____x multiplication *n.* a rectangular array of numbers, symbols, or expressions, arranged in rows and columns and often enclosed in brackets; an enclosure within which something originates or develops
42. the characters that re_____nt numbers *v.* to speak, act, or be present on behalf of another person or group; to form or constitute
43. ad_____on of vectors *n.* the act or process of adding something to something else; the process of adding numbers
44. not to be seen no_____ys *adv.* at the current time, in comparison to the past
45. ec_____cs professor *n.* the branch of social science that deals with the production, consumption, and transfer of goods and services
46. in_____ve judgment *adj.* obtained through feelings rather than facts or proof
47. ele_____cs store *n.* the branch of physics and technology that deals with the behavior and control of electrons and the use of electronic devices and systems
48. in_____ve eating *adj.* obtained through feelings rather than facts or proof

ANSWERS: 38. dimension, 39. algebra, 40. nowadays, 41. matrix, 42. represent, 43. addition, 44. nowadays, 45. economics, 46. intuitive, 47. electronics, 48. intuitive

49. laws of ph____s *n.* the science of matter and energy and their interactions
50. ele_____cs industry *n.* the branch of physics and technology that deals with the behavior and control of electrons and the use of electronic devices and systems
51. a br___h pipe *n.* a division of a tree or woody shrub that grows out from the trunk or a main stem; a division of some larger or more complex organization
52. an____t stories *adj.* relating to the long ago, particularly the historical period preceding the fall of the Western Roman Empire; very old
53. issue a w__t *n.* a written legal order or command
54. a g__d design *n.* a pattern of regularly spaced horizontal and vertical lines; a system of high tension cables by which electrical power is distributed throughout a region
55. a con_____ly varying mind *adv.* all the time
56. a r_w of cherry trees *n.* an arrangement of objects or people side by side in a line; (verb) to propel a boat through the water using oars
57. sc___r field *n.* a quantity in physics or mathematics defined only by its magnitude and not by direction or orientation, which are represented by a single numerical value, such as temperature or speed
58. the cor_____ing word in Spanish *adj.* similar to, connected with, or accompanying something, especially in position or purpose

ANSWERS: 49. physics, 50. electronics, 51. branch, 52. ancient, 53. writ, 54. grid, 55. constantly, 56. row, 57. scalar, 58. corresponding

59. gr____cs engine *n.* images, designs, or drawings used in websites, books, magazines, etc.
60. a good grounding in mat____cs *n.* the science dealing with the logic of quantities, shapes, spaces, and arrangement
61. en___e data *v.* to convert information into a code or format suitable for storage or transmission
62. a w__t of summons *n.* a written legal order or command
63. criminal on death r_w *n.* an arrangement of objects or people side by side in a line; (verb) to propel a boat through the water using oars
64. a n__b mind *adj.* unable to feel physical sensation and movement; not showing human feeling or sensitivity
65. an ar__y of troops *n.* a large group or collection of things or people, especially one that is impressive or attractive
66. tr____te the emotion to a movement *v.* to convert or change words into another language
67. have an aw____e birthday *adj.* inspiring fear, admiration, or respect; very good, nice, fun, etc.
68. mat____cs competition *n.* the science dealing with the logic of quantities, shapes, spaces, and arrangement

ANSWERS: 59. graphics, 60. mathematics, 61. encode, 62. writ, 63. row, 64. numb, 65. array, 66. translate, 67. awesome, 68. mathematics

Session 3: Fill in the Blanks

1. He studied the _____ of radiation.
n. the science of matter and energy and their interactions
2. In _____ private corporations provide healthcare services.
n. the act or process of adding something to something else; the process of adding numbers
3. _____ pattern roads often appear in urban areas.
n. a pattern of regularly spaced horizontal and vertical lines; a system of high tension cables by which electrical power is distributed throughout a region
4. Can you _____ 123321 by eleven?
v. to separate or cause to separate into parts or groups
5. The software can _____ and decode encrypted messages.
v. to convert information into a code or format suitable for storage or transmission
6. The newspaper devoted several _____ to the affair.
n. one of the vertical blocks that split content on a page or screen from top to bottom; an upright pillar that often supports an arch, entablature, or other structure or stands alone as a monument
7. The software could _____ the encrypted data and reveal the hidden information.
v. to convert something, such as a message or piece of information, from a specific form into one that you can understand

ANSWERS: 1. physics, 2. addition, 3. Grid, 4. divide, 5. encode, 6. columns, 7. decode

8. I need to _____ the cost of my expenses from my income to see how much money I have left.
- v. to take away or deduct a quantity or amount from a total; to remove or eliminate something from a larger whole
9. _____ a number by itself twice.
- v. to add a number to itself a specified number of times; to increase or cause to increase very much in number or quantity
10. To protect their sensitive information, many businesses _____ their files.
- v. to convert information or data into a code, thereby making it unreadable without a key or password; to conceal or obscure information in a way that makes it inaccessible to unauthorized persons
11. The _____ number on the dial was 3.
- adj. similar to, connected with, or accompanying something, especially in position or purpose
12. We elected him to _____ us at the international conference.
- v. to speak, act, or be present on behalf of another person or group; to form or constitute
13. The mobile application industry is _____ changing.
- adv. all the time
14. The _____ of numbers on the spreadsheet allowed the accountant to track the company's profits and losses easily.
- n. a rectangular array of numbers, symbols, or expressions, arranged in rows and columns and often enclosed in brackets; an enclosure within which something originates or develops

ANSWERS: 8. subtract, 9. Multiply, 10. encrypt, 11. corresponding, 12. represent, 13. constantly, 14. matrix

15. They have been living near water since _____ times.

adj. relating to the long ago, particularly the historical period preceding the fall of the Western Roman Empire; very old

16. The software engineers developed a new _____ algorithm to protect users' data.

n. the study of the techniques and methods used for secure communication and information processing, particularly using codes and ciphers

17. He has a flair for _____.

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

18. Overall _____ are approximately 400x200mm.

n. a measurable extent of a particular kind, such as width, height, or length

19. His classmates were laboring with advanced _____.

n. a type of mathematics in which signs and letters represent numbers

20. I had an _____ feeling that I might be pregnant.

adj. obtained through feelings rather than facts or proof

21. The customer on the Internet has to choose one from a formidable _____ of products.

n. a large group or collection of things or people, especially one that is impressive or attractive

22. He was served with a _____ of eviction, giving him the notice to vacate the property.

n. a written legal order or command

ANSWERS: 15. ancient, 16. cryptography, 17. mathematics, 18. dimensions, 19. algebra, 20. intuitive, 21. array, 22. writ

23. My dream is to become a great _____ designer like her.
n. images, designs, or drawings used in websites, books, magazines, etc.
24. The _____ quantity of distance represents only magnitude without considering direction.
n. a quantity in physics or mathematics defined only by its magnitude and not by direction or orientation, which are represented by a single numerical value, such as temperature or speed
25. _____ the text from Italian into English.
v. to convert or change words into another language
26. My left arm became _____.
adj. unable to feel physical sensation and movement; not showing human feeling or sensitivity
27. People can clone a sheep _____.
adv. at the current time, in comparison to the past
28. The company specializes in manufacturing and selling cutting-edge _____.
n. the branch of physics and technology that deals with the behavior and control of electrons and the use of electronic devices and systems
29. There is a lot of _____ nature and food in Hawaii.
adj. inspiring fear, admiration, or respect; very good, nice, fun, etc.
30. He was the leader of the demonstrators and spoke out against the war in the front _____.
n. an arrangement of objects or people side by side in a line; (verb) to propel a boat through the water using oars

ANSWERS: 23. graphics, 24. scalar, 25. Translate, 26. numb, 27. nowadays, 28. electronics, 29. awesome, 30. row

31. His class will cover an introduction to agricultural _____.

n. the branch of social science that deals with the production, consumption, and transfer of goods and services

32. The _____ of the tree had fallen and blocked the road.

n. a division of a tree or woody shrub that grows out from the trunk or a main stem; a division of some larger or more complex organization

33. People tend to make _____ predictions.

adj. of, relating to, or consisting of lines or length; able to be expressed as a straight line, especially on a graph

34. The painting is _____ and there is no other like it.

adj. being the only one of its kind; unlike anything else

ANSWERS: 31. economics, 32. branch, 33. linear, 34. unique,