

Brooklyn Tech

1. Mathematics

Toss Up: Short Answer

In a triangle, the sides are 13, 14, and 15. Find the altitude of the triangle.

Toss Up Answer: 12

Bonus: Multiple Choice

What is 2017 to the second power?

W) 4068290

X) 4068269

Y) 4068279

Z) 4068289

Bonus Answer: Z

2. Chemistry

Toss Up: Short Answer

What type of energy release allows the formation of ionic bonds to be an exothermic process?

Toss Up Answer: latic energy

Bonus: Short Answer

How many electrons fill the f orbital?

Bonus Answer: 14

3. Chemistry

Toss Up: Multiple Choice

Which of the following two compounds will react in an aqueous solution to form a precipitate?

W) Ammonium Nitrate and Sodium Chloride

X) Potassium Hydroxide and Calcium Acetate

Y) Magnesium Bromide and Sodium Chromate

Z) Lead Chlorate and Potassium Sulfide

Toss Up Answer: Z

Bonus: Short Answer

Which isotope of Uranium is fissile?

Bonus Answer: Uranium-235

4. Biology

Toss Up: Short Answer

What is the name of the enzyme that makes ATP from ADP and inorganic phosphate?

Toss Up Answer: ATP synthase

Bonus: Short Answer

What is the result of an extra chromosome 21, so that each body cell has a total of 47 chromosomes?

Bonus Answer: Down Syndrome/trisomy 21

5. Biology

Toss Up: Short Answer

What is the largest venomous organism?

Toss Up Answer: Komodo Dragon (or Komodo Monitor)

Bonus: Multiple Choice

What composes marine snow?

- W) Discarded manmade products like plastics
- X) Light as it passes through the photic zones in a body of water
- Y) Organic matter such as waste and dead cells
- Z) Sulfides and other minerals ejected from hydrothermal vents

Bonus Answer: Y

6. Biology

Toss Up: Multiple Choice

In which phase of meiosis are the chromosomes pulled apart?

- W) Anaphase 1
- X) Prophase 1
- Y) Anaphase 2
- Z) Metaphase

Toss Up Answer: W

Bonus: Short Answer

In what types of organisms does meiosis occur?

Bonus Answer: Eukaryote

7. Biology

Toss Up: Multiple Choice

Chlorophyll is a naturally occurring chelate compound in which central metal is

- W) Copper
- X) Magnesium
- Y) Iron
- Z) Calcium

Toss Up Answer: X

Bonus: Multiple Choice

Pollination by birds is called:

- W) autogamy
- X) ornithophily (pron: or-nith-o-philly)
- Y) entomophily (pron: ent-eh-mof-illy)
- Z) anemophily (pron: an-eh-mof-illy)

Bonus Answer: X

8. Chemistry

Toss Up: Multiple Choice

Bromine is a

- W) black solid
- X) red liquid
- Y) colorless gas
- Z) highly inflammable gas

Toss Up Answer: X

Bonus: Multiple Choice

Which of the following is not an isotope of hydrogen?

- W) Tritium
- X) Deuterium
- Y) Protium
- Z) Yttrium

Bonus Answer: Z

9. Chemistry

Toss Up: Multiple Choice

The inert gas which is substituted for nitrogen in the air used by deep sea divers for breathing, is

- W) Argon
- X) Xenon
- Y) Helium
- Z) Krypton

Toss Up Answer: Y

Bonus: Multiple Choice

The property of a substance to absorb moisture from the air on exposure is called

- W) osmosis
- X) deliquescence
- Y) efflorescence
- Z) desiccation

Bonus Answer: X

10. Biology

Toss Up: Multiple Choice

If an organism has a haploid number of 28, how many chromosomes does it have?

- W) 14
- X) 28
- Y) 42
- Z) 56

Toss Up Answer: Z

Bonus: Multiple Choice

Cellular respiration in the absence of oxygen is called fermentation. What is the product of fermentation in animal cells?

- W) Acetyl-CoA
- X) alcohol
- Y) carbon dioxide
- Z) lactic acid

Bonus Answer: Z

11. Earth and Space Science

Toss Up: Multiple Choice

Which atmosphere do meteors burn up?

- W) stratosphere
- X) mesosphere
- Y) troposphere
- Z) thermosphere

Toss Up Answer: X

Bonus: Multiple Choice

Which planet has the longest year?

- W) Venus
- X) Jupiter
- Y) Uranus
- Z) Neptune

Bonus Answer: Z

12. Chemistry

Toss Up: Short Answer

How many electrons can fill the d orbital?

Toss Up Answer: 10 electrons

Bonus: Short Answer

If a process is only thermodynamically favorable at high temperatures then it has...

Bonus Answer: High enthalpy and high entropy

13. Earth and Space Science

Toss Up: Short Answer

What is the name of the constellation that lies within the Summer Triangle?

Toss Up Answer: Vulpecula

Bonus: Short Answer

Due to the ionized oxygen creating a green color, is another name for the Dumbbell Nebula?

Bonus Answer: Apple Core Nebula

14. Mathematics

Toss Up: Multiple Choice

What is 10 factorial

- W) 370431
- X) 390216
- Y) 429764
- Z) 3628800

Toss Up Answer: Z

Bonus: Multiple Choice

what type of series is this 1,1,2,3....

- W) geometric
- X) arithmetic
- Y) taylor
- Z) none

Bonus Answer: Z

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15. Physics

Toss Up: Multiple Choice

Radio waves are propagated through the inter- action of

- W) nuclear and electric fields
- X) electric and magnetic fields
- Y) gravitational and magnetic fields
- Z) gravitational and electric fields

Toss Up Answer: X

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Bonus: Multiple Choice

A positively charged glass rod attracts object X. The net charge of object X

- W) may be zero or negative
- X) may be zero or positive
- Y) must be negative
- Z) must be positive

Bonus Answer: W

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16. Earth and Space Science

Toss Up: Short Answer

What is the black hole region furthest from the event horizon?

Toss Up Answer: The ergosphere

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Bonus: Short Answer

What type of black hole has an ergosphere?

Bonus Answer: A rotating black hole

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17. Chemistry

Toss Up: Multiple Choice

What is the name of CoCl_2 ?

- W) Cobalt(II) Chloride
- X) Cobalt(III) Chloride
- Y) Copper(II) Chloride
- Z) Copper(III) Chloride

Toss Up Answer: W

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Bonus: Short Answer

What type of compound is CoCl_2 ?

Bonus Answer: Ionic Compound

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18. Chemistry

Toss Up: Short Answer

At what point does a liquid boil?

Toss Up Answer: When the vapor pressure and atmospheric pressure are equal.

Bonus: Short Answer

Which term is used to describe the resistance to flow of a liquid?

Bonus Answer: viscosity

19. Earth and Space Science

Toss Up: Multiple Choice

What do we call a protostar that evolves to a point where it begins steady state hydrogen fusion in its core and first achieves hydrostatic equilibrium?

- W) First Born Main Sequence Star
- X) Zero Age Main Sequence Star
- Y) T-Tauri Star
- Z) Proplyd

Toss Up Answer: X

Bonus: Multiple Choice

The term \diamond reddening \diamond explains what phenomenon?

- W) redshifting of distant galaxies from the expansion of the universe
- X) the absorption of higher wavelength light by gas and dust that block distant galaxies from Earth's view
- Y) the decreasing amount of red wavelengths observed emitting from distant Type Ia supernovae
- Z) the process by which dust grains absorb and scatter shorter wavelength light more efficiently

Bonus Answer: X

20. Earth and Space Science

Toss Up: Short Answer

What atmospheric gas does O.C.O monitor?

Toss Up Answer: Carbon dioxide.

Bonus: Short Answer

What geometric distortion does across-track scanners generally experience from the rotation of the Earth?

Bonus Answer: Skew distortion.

21. Mathematics

Toss Up: Short Answer

$(1+(1/X))^2 + 6(1+(1/X)) + 8 = 0$ solve for x

Toss Up Answer: $1/(1 \pm \sqrt{8/5})$

Explanation: substitute $(1 + (1/X))$ for another variable like y. Then it's just a simple quadratic that you can factor

Bonus: Multiple Choice

$2(X^{5/3}) + 64 = 0$ solve for X

- W) 8
- X) 4^5
- Y) $(-2)^3$
- Z) 3^3

Bonus Answer: Y

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22. Earth and Space Science

Toss Up: Multiple Choice

What direction does a comet's tail face?

W) away from the sun

X) towards the sun

Y) away from the moon

Z) towards the moon

Toss Up Answer: W

Bonus: Short Answer

What was the first man made satellite in space called?

Bonus Answer: Sputnik 1

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23. Earth and Space Science

Toss Up: Short Answer

What are the three types of rock?

Toss Up Answer: Igneous, Sedentary, and Metamorphic rocks.

Bonus: Multiple Choice

Which of the following is not a igneous rock.

W) Diorite

X) Gabbro

Y) Limestone

Z) Granite

Bonus Answer: Y

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24. Mathematics

Toss Up: Short Answer

$\sin(x+20)=\cos(50)$

Toss Up Answer: $X=20$

Bonus: Short Answer

X^2+4x+4

Bonus Answer: $X=2$

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25. Earth and Space Science

Toss Up: Multiple Choice

How old is universe

W) 15 b

X) 14b

Y) 1 year

Z) 0

Toss Up Answer: X

Bonus: Multiple Choice

- D
- W) D
- X) D
- Y) D
- Z) D

Bonus Answer: W

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26. Biology

Toss Up: Multiple Choice

If one parent has an autosomal dominant disease, what is the chance of the offspring having the same disease?

- W) 25%
- X) 75%
- Y) 50%
- Z) 100%

Toss Up Answer: Y

Bonus: Short Answer

What is osteomalacia?

Bonus Answer: the softening of bones

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27. Earth and Space Science

Toss Up: Multiple Choice

How old is universe

- W) 15 b
- X) 14b
- Y) 1 year
- Z) 0

Toss Up Answer: X

Bonus: Multiple Choice

- D
- W) D
- X) D
- Y) D
- Z) D

Bonus Answer: W

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28. Mathematics

Toss Up: Multiple Choice

$Y=11$ find x in $y=4(x^2)-3$

- W) 3
- X) 4
- Y) 2
- Z) 5

Toss Up Answer: Y

Bonus: Short Answer

Find x, $45-x=21^2$

Bonus Answer: -396

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29. Biology

Toss Up: Short Answer

Name the two tests a pregnant woman can take to determine any genetic diseases the baby will have.

Toss Up Answer: -Amniocentesis

-Chorionic Villus Sampling

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Bonus: Short Answer

What are the 3 parts of a nucleotide?

Bonus Answer: Nitrogenous base, 5 carbon Pentose sugar, phosphate group.

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30. Mathematics

Toss Up: Short Answer

What type of function looks like a logarithmic function when reflected over line $y=x$?

Toss Up Answer: Exponential function

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Bonus: Short Answer

Solve for x in $32=2^x$

Bonus Answer: 5

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31. Mathematics

Toss Up: Multiple Choice

If the height of a pole is equal to 24 meters and it's shadow is equal to 3.5 meters. what is the height of a man with a shadow of 10.5 meters?

W) 18 meters

X) 72 yards

Y) 72 meters

Z) 78 yards

Toss Up Answer: Y

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Bonus: Multiple Choice

What is the value of x when $3x$ to the power of 4 equals 19683?

W) 7

X) 8

Y) 9

Z) 10

Bonus Answer: Y

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32. Chemistry

Toss Up: Multiple Choice

At what temperature in degrees Celsius is water most dense?

W) 11

X) 4

Y) 0

Z) -5

Toss Up Answer: X

Bonus: Multiple Choice

In which compound or molecule is Oxygen's oxidation number not -2?

- W) Hydrogen oxide
- X) Hydrogen flouride
- Y) Dioxygen diflouride
- Z) Potassium hydroxide

Bonus Answer: Y

33. Earth and Space Science

Toss Up: Multiple Choice

What sphere do meteors burn up fastest?

- W) Mesosphere
- X) Stratosphere
- Y) Exosphere
- Z) Thermosphere

Toss Up Answer: W

Bonus: Multiple Choice

Which planet has the smallest maximum eastern elongation?

- W) Neptune
- X) Mercury
- Y) Venus
- Z) Mars

Bonus Answer: X

34. Biology

Toss Up: Multiple Choice

What enzyme is responsible for "unzipping" the DNA strand during replication?

- W) DNA helicase
- X) DNA ligase
- Y) DNA polymerase
- Z) RNA primase

Toss Up Answer: W

Bonus: Multiple Choice

Which macromolecule can be formed using the sugars produced by plants during photosynthesis?

- W) cellulose
- X) DNA
- Y) lipid
- Z) protein

Bonus Answer: W

35. Physics

Toss Up: Short Answer

Solve for x to the nearest thousandth: $3 \times 2^{(5x)} = 216$

Toss Up Answer: X=1.234

Bonus: Multiple Choice

How many points of intersection between the graphs: $y-x-2=0$ and $(x-1)^2 + (x-3)^2 = 8$

W) 1

X) 2

Y) 0

Z) Not enough information to answer

Bonus Answer: W

36. Mathematics**Toss Up: Multiple Choice**

Find x when $(x^2)-4x-12 = 0$

W) $x=\{6, -2\}$

X) $x=\{6, 2\}$

Y) $x=\{-6, 2\}$

Z) $x=\{-6, -2\}$

Toss Up Answer: Y

Bonus: Short Answer

Given: triangle abc is a right angle, d is the midpoint of line ab and e is the midpoint of line Bc, $de \parallel ac$ $de=7$, $ac=14$, $ad=5$ find db

Bonus Answer: 5

37. Mathematics**Toss Up: Multiple Choice**

What is the following in degrees? $7\pi/8$

W) 157 degrees

X) 155 degrees

Y) 157.5 degrees

Z) 200 degrees

Toss Up Answer: Y

Bonus: Short Answer

Find the following in radian: 280 degrees

Bonus Answer: $14\pi/9$

38. Mathematics**Toss Up: Short Answer**

What is the exact value of $\sin(225)$ and $\cos(225)$?

Toss Up Answer: $-(\sqrt{2})/2$ for both

Bonus: Short Answer

What is the exact value of the period of the sine wave in radian form: $y=4\sin(5x)$

Bonus Answer: $2\pi/5$

39. Mathematics

Toss Up: Short Answer

What is the value of theta if $\cos(\theta) = -\frac{\sqrt{2}}{2}$?

Toss Up Answer: 225 degrees or $5\pi/4$. Adding 360 degrees any amount of times to 225 degrees or 2π any amount of times to $5\pi/4$ is acceptable.

Bonus: Short Answer

Find the value of $\sin(\theta)$ in the expression $\sin(\arctan(x))$

Bonus Answer: x

40. Mathematics

Toss Up: Short Answer

Graph theory is the study of graphs (mathematical structures that represent the relationship between objects through vertices or points and edges or connections between points). Describe the relationship of vertices, edges, and faces through a mathematical equation.

Toss Up Answer: V (the number of vertices) - E (number of edges) + F (number of faces) = 2

Bonus: Short Answer

Name the type of path that doesn't repeat any edges and has the same initial and final vertex.

Bonus Answer: Euler Circuit

41. Physics

Toss Up: Short Answer

What is the units for displacement?

Toss Up Answer: Meters

Bonus: Short Answer

Name all seven SI base units.

Bonus Answer: ampere, mole, meter, kelvin, second, kilogram, candela

42. Biology

Toss Up: Short Answer

Which of the following is a disease extracted from deer ticks, also known as *Borrelia burgdorferi*?

Toss Up Answer: Lyme disease, or borreliosis

Bonus: Short Answer

What brain-eating illness is obtained from eating other humans, very similar to Mad Cow disease?

Bonus Answer: Kuru

43. Biology

Toss Up: Short Answer

What element is needed for the creation of thyroid hormones?

Toss Up Answer: Iodine

Bonus: Short Answer

Name one thyroid hormone.

Bonus Answer: thyroxine/ triiodothyronine

44. Biology

Toss Up: Multiple Choice

Who created amino acids using a model of earth's early environment?

- W) Charles Darwin
- X) Robert Hooke
- Y) Stanley Miller
- Z) Francis Crick

Toss Up Answer: Y

Bonus: Short Answer

What is the scientific name of spiny sea urchin?

Bonus Answer: Strongylocentrotus droebachiensis

45. Chemistry

Toss Up: Multiple Choice

Which element has the highest electronegativity?

- W) Bromine
- X) Krypton
- Y) Iodine
- Z) Xenon

Toss Up Answer: X

Bonus: Multiple Choice

What is the anhydride of sulfuric acid?

- W) Hydrogen Sulfide
- X) Hydrogen Oxide
- Y) Sulfur Dioxide
- Z) Sulfur Trioxide

Bonus Answer: Z

46. Chemistry

Toss Up: Multiple Choice

Which of the following hydrocarbons is the most reactive?

- W) C₂H₆
- X) C₂H₄
- Y) C₂H₂
- Z) CH₄

Toss Up Answer: Y

Bonus: Short Answer

What is the name of the acid mixture that can dissolve Gold?

Bonus Answer: Aqua Regia

47. Chemistry

Toss Up: Multiple Choice

Which of the following substances would be expected to have the highest melting point?

- W) Sodium Chloride
- X) Calcium Chloride
- Y) Potassium Hydride
- Z) Magnesium Oxide

Toss Up Answer: Z

Bonus: Multiple Choice

HF is a weak acid when compared with HCl. How can this be explained?

- W) HF has a stronger covalent bond than does HCl
- X) HF has a weaker covalent bond than does HCl
- Y) HF has hydrogen bonding, while HCl has dipole-dipole bonding
- Z) HF has dipole-dipole bonding, while HCl has hydrogen bonding

Bonus Answer: W

48. Chemistry

Toss Up: Multiple Choice

Sodium hydroxide and copper(II) nitrate solutions are mixed. What precipitates out?

- W) No precipitate because no reaction occurs
- X) Copper
- Y) Sodium Nitrate
- Z) Copper(II) Hydroxide

Toss Up Answer: Z

Bonus: Short Answer

What is the oxidation number of Manganese in MnO_2 ?

Bonus Answer: +4

49. Chemistry

Toss Up: Short Answer

What is the most electropositive element on the periodic table?

Toss Up Answer: Francium

Bonus: Short Answer

What is the lightest element to have isotopes that are all radioactive?

Bonus Answer: Technetium

50. Chemistry

Toss Up: Multiple Choice

The law which states that the amount of gas dissolved in a liquid is proportional to its partial pressure is

- W) Dalton's law
- X) Gay Lussac's law
- Y) Henry's law
- Z) Raoult's law

Toss Up Answer: Y

Bonus: Multiple Choice

The most malleable metal is

- W) platinum
- X) silver
- Y) iron
- Z) gold

Bonus Answer: Z

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51. Biology

Toss Up: Short Answer

What is the name of the family white-tailed deer, elk, and moose belong to?

Toss Up Answer: Cervidae

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Bonus: Multiple Choice

in which of these species of deer do antlers grow on both genders?

W) Reindeer

X) White-tailed deer

Y) Fallow deer

Z) All of the previously mentioned species have antlers on both genders

Bonus Answer: W

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52. Earth and Space Science

Toss Up: Short Answer

Who, despite being against it as the beginnings of our universe, gave the Big Bang its name?

Toss Up Answer: Fred Hoyle

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Bonus: Short Answer

Who was the first person to determine starlight took time and had to travel to reach our eyes?

Bonus Answer: Edgar Allan Poe

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53. Biology

Toss Up: Multiple Choice

What does DNA code for?

W) Acid mine

X) Amino acids

Y) Glucose

Z) Apple Pie

Toss Up Answer: X

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Bonus: Short Answer

Who created the idea of evolution?

Bonus Answer: Who created the idea of evolution?

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