

ROUND 8

TOSS-UP

1) PHYSICS *Multiple Choice* Physicists most commonly call a mass moving in a straight line path as having:

- W) angular or rotational momentum
- X) straight momentum
- Y) translational momentum
- Z) second order momentum

ANSWER: Y) TRANSLATIONAL MOMENTUM

BONUS

1) PHYSICS *Short Answer* On an electric schematic, what does the symbol of a horizontal line interrupted by a saw tooth shaped line represent?

ANSWER: RESISTOR

TOSS-UP

2) CHEMISTRY *Multiple Choice* Which of the following is NOT a final product of the overall cell reaction in a hydrogen fuel cell:

- W) heat
- X) electric power
- Y) carbon dioxide
- Z) water

ANSWER: Y) CARBON DIOXIDE

BONUS

2) CHEMISTRY *Short Answer* Which element has the following ground-state electron configuration: $1s^2 2s^2 2p^6$ (read as: 1s2, 2s2, 2p6)

ANSWER: NEON (ACCEPT: Ne)

TOSS-UP

3) **BIOLOGY** *Multiple Choice* Which of the following accounts for the largest decline in death rate in the USA between the years 1900 and 1990:

- W) accidents
- X) cancer
- Y) cardiovascular disease
- Z) infectious disease

ANSWER: Z) INFECTIOUS DISEASE

BONUS

3) **BIOLOGY** *Short Answer* What accessory organ allows bony fish to remain at a certain depth in the water without swimming?

ANSWER: SWIMBLADDER

TOSS-UP

4) **ASTRONOMY** *Multiple Choice* Astronomers usually detect the electromagnetic emissions of a single neutron star in what single form:

- W) cosmic radiation
- X) microwaves
- Y) radio waves
- Z) infrared waves

ANSWER: Y) RADIO WAVES

BONUS

4) **ASTRONOMY** *Short Answer* What moon of Neptune orbits in a retrograde direction?

ANSWER: TRITON (DO NOT ACCEPT: TITAN, a moon of Saturn)

TOSS-UP

5) MATH *Short Answer* What is the square root of 256?

ANSWER: 16

BONUS

5) MATH *Short Answer* A farmer wishes to make a straight barbed wire fence 80 feet long. He wants to have a fence post every 8 feet. How many fence posts does he need?

ANSWER: 11

(Solution: one at the start and one every 8 feet there after $80/8 + 1 = 11$)

TOSS-UP

6) EARTH SCIENCE *Multiple Choice* Which is NOT true about the concentration of methane gas in the atmosphere:

- W) it is generated by biological activity related to rice cultivation
- X) it is generated as a byproduct of the digestive processes of cattle
- Y) it is generated as a byproduct of refrigerants and aerosols
- Z) it has an atmospheric lifetime of about 10 years

ANSWER: Y) IS GENERATED AS A BYPRODUCT OF REFRIGERANTS AND AEROSOLS

BONUS

6) EARTH SCIENCE *Short Answer* What are the names of the tides that occur when the sun's tidal bulges and the moon's tidal bulges are at right angles to each other?

ANSWER: NEAP TIDES

TOSS-UP

7) GENERAL SCIENCE *Multiple Choice* What percentage of the world's ice is in Antarctica?

- W) 10 percent
- X) 25 percent
- Y) 50 percent
- Z) 90 percent

ANSWER: Z) 90 PERCENT

BONUS

7) GENERAL SCIENCE *Multiple Choice* If each of the following woods were seasoned to an equally low water content, which would release the most heat per cord when burned?

- W) White Oak
- X) Red Maple
- Y) White Birch
- Z) Mountain Aspen

ANSWER: W) WHITE OAK

TOSS-UP

8) GENERAL SCIENCE *Multiple Choice* Which of the following is NOT an example of systems software:

- W) file management tools
- X) linkers
- Y) loaders
- Z) word processing software

ANSWER: Z) WORD PROCESSING SOFTWARE

BONUS

8) GENERAL SCIENCE *Short Answer* What is the largest WAN in existence today?

ANSWER: THE INTERNET

TOSS-UP

9) PHYSICS *Multiple Choice* A figure skater who, while spinning in place, pulls her arms in to increase her rotational speed, is most closely exhibiting which of the following:

- W) conservation of angular momentum
- X) centrifugal force
- Y) satellite motion
- Z) centripetal acceleration

ANSWER: W) CONSERVATION OF ANGULAR MOMENTUM

BONUS

9) PHYSICS *Short Answer* What cycle most directly describes the working cycle of a heat engine operating as an ideal engine of maximum thermal efficiency?

ANSWER: CARNOT CYCLE

TOSS-UP

10) CHEMISTRY *Multiple Choice* The use of electricity to decompose molten sodium chloride into its component elements is an example of:

- W) electrolysis
- X) galvanization
- Y) a voltaic cell
- Z) electroplating

ANSWER: W) ELECTROLYSIS

BONUS

10) CHEMISTRY *Short Answer* Convert the molecular structure of the hydrocarbon C_5H_{12} into its straight-chain Condensed Structural Formula:

ANSWER: $CH_3CH_2CH_2CH_2CH_3$

TOSS-UP

11) **BIOLOGY** *Multiple Choice* Physicians give patients immuno-suppressing drugs after an organ transplant to prevent:

- W) infection
- X) a graft versus host response
- Y) rejection of the transplant
- Z) viral infections

ANSWER: Y) REJECTION OF THE TRANSPLANT

BONUS

11) **BIOLOGY** *Short Answer* In many arthropods, the segments of the body are grouped into 3 distinct parts. Name all three parts:

ANSWER: HEAD, THORAX, AND ABDOMEN

TOSS-UP

12) **ASTRONOMY** *Short Answer* Most astronomers believe that these celestial bodies are at the center of quasars and are the main reason for their large energy emissions:

ANSWER: BLACK HOLES

BONUS

12) **ASTRONOMY** *Short Answer* These doughnut shaped zones of atomic particles consists of electrons and protons captured by the Earth's magnetic field from the solar winds and are called:

ANSWER: VAN ALLEN BELTS

TOSS-UP

13) MATH *Short Answer* What form of geometry is one in which the parallel postulate of Euclidean Geometry does NOT hold:

ANSWER: NON-EUCLIDEAN GEOMETRY (ACCEPT: HYPERBOLIC GEOMETRY, BOLYAI - LOBACHEVSKY GEOMETRY, or RIENMANN GEOMETRY)

BONUS

13) MATH *Short Answer* If the length of the cycloid is 4 times the diameter of a rotating circle, then the area under the arch traced out by that cycloid is how many times the area of the rotating circle?

ANSWER: 3 TIMES

TOSS-UP

14) EARTH SCIENCE *Multiple Choice* A low-gradient stream would most likely form a:

- W) V-shaped valley
- X) waterfall
- Y) meander
- Z) straight channel

ANSWER: Y) MEANDER

BONUS

14) EARTH SCIENCE *Multiple Choice* The angle of insolation on the Earth's surface is most direct at which latitude:

- W) 0°
- X) 90° North or South
- Y) 66 ½° North or South
- Z) 23 ½° North or South

ANSWER: W) 0°

TOSS-UP

15) GENERAL SCIENCE *Multiple Choice* At small apertures or high f stops, a single lens reflex camera will have which of the following properties:

- W) have more light gathering capacity
- X) generally require fast shutter speeds for all films in normal daylight
- Y) have more depth of field
- Z) have less depth of field

ANSWER: Y) HAVE MORE DEPTH OF FIELD

BONUS

15) GENERAL SCIENCE *Short Answer* *Juglans nigra* is the genus and species of what common name tree, whose wood is prized for its qualities in furniture making:

ANSWER: BLACK WALNUT (ACCEPT: WALNUT)

TOSS-UP

16) GENERAL SCIENCE *Short Answer* A term coined by Jack Niles in the early 1970's to describe an office where workers can work at home on a computer and transmit data and documents to a central office via telephone lines, is:

ANSWER: TELECOMMUTING

BONUS

16) GENERAL SCIENCE *Short Answer* What is the largest possible 8 bit binary number?

ANSWER: 11111111 (ACCEPT: 8 ONES)

TOSS-UP

17) PHYSICS *Multiple Choice* The atom's nucleus is held together by which of the following:

- W) strong interactions of the quark and gluon constituents of the atom's nucleus
- X) strong interactions of the quark and lepton constituents of the atom's nucleus
- Y) weak interactions of the quark and lepton constituents of the atom's nucleus
- Z) strong interactions of the lepton and gluon constituents of the atom's nucleus

ANSWER: W) STRONG INTERACTIONS OF THE QUARK AND GLUON CONSTITUENTS OF THE ATOM'S NUCLEUS

BONUS

17) PHYSICS *Short Answer* If F equals electric force, and q and q' (read as: q-prime) are the charges on two particles, the expression F is proportional to q times q' divided by distance squared is what law?

ANSWER: COULOMB'S LAW

TOSS-UP

18) CHEMISTRY *Multiple Choice* Which of the following metals react violently with water to produce hydrogen gas:

- W) sodium
- X) zinc
- Y) platinum
- Z) silver

ANSWER: W) SODIUM

BONUS

18) CHEMISTRY *Short Answer* What colorless liquid was originally produced from the distillation of wood and is often referred to as wood alcohol:

ANSWER: METHANOL (ACCEPT: METHYL ALCOHOL OR CH_3OH)

TOSS-UP

19) **BIOLOGY** *Multiple Choice* Which of the following does NOT directly function in the cytoskeleton:

- W) microtubules
- X) microfilaments
- Y) spectrin
- Z) actin

ANSWER: Y) SPECTRIN

BONUS

19) **BIOLOGY** *Short Answer* Vibration of this membrane moves 3 small bones that span the cavity of the middle ear:

ANSWER: TYMPANIC MEMBRANE (ACCEPT: EARDRUM)

TOSS-UP

20) **MATH** *Short Answer* According to “Set Theory”, sets that do NOT contain themselves are typically referred to as:

ANSWER: NORMAL SETS

BONUS

20) **MATH** *Short Answer* If you start with 1 bacterium and double the number every 15 minutes, how many bacteria will you have at the end of 3 hours and 45 minutes?

ANSWER: 32,768

TOSS-UP

21) EARTH SCIENCE *Multiple Choice* The ability of rock or soil to transmit water is called its:

- W) permeability
- X) porosity
- Y) viscosity
- Z) wetability

ANSWER: W) PERMEABILITY

BONUS

21) EARTH SCIENCE *Short Answer* Order the following minerals from the hardest to the softest:
Topaz; Corundum; Quartz; Fluorite

ANSWER: CORUNDUM; TOPAZ; QUARTZ; FLUORITE

TOSS-UP

22) GENERAL SCIENCE *Multiple Choice* The SI prefix for the quantity 10^{15} is:

- W) peta
- X) eta
- Y) tera
- Z) yotta

ANSWER: W) PETA

BONUS

22) GENERAL SCIENCE *Short Answer* Order the following from the SMALLEST unit of distance to the LARGEST: mile, rod, feet, furlong.

ANSWER: FEET, ROD, FURLONG, MILE

TOSS-UP

23) PHYSICS *Short Answer* By passing current through a wire wrapped around an iron rod, William Sturgeon invented the:

ANSWER: ELECTROMAGNET

BONUS

23) PHYSICS *Multiple Choice* Which of the following is NOT true of Guglielmo Marconi's experiments on wireless transmission:

- W) in 1901 he transmitted a signal from Newfoundland to England
- X) he defied current belief on line-of-sight transmission
- Y) his work was a practical application of the work of James Clerk Maxwell
- Z) his success was a vindication of his belief in the reflective properties of the ionosphere

ANSWER: Z) HIS SUCCESS WAS A VINDICATION OF HIS BELIEF IN THE REFLECTIVE PROPERTIES OF THE IONOSPHERE

(Solution: the ionosphere was unknown at that time)

TOSS-UP

24) CHEMISTRY *Multiple Choice* Which of the following is NOT true about cholesterol:

- W) there is no cholesterol in plants
- X) cholesterol is found in meats, milk and eggs
- Y) cholesterol is not synthesized in the human body
- Z) cholesterol is a component of cellular membranes

ANSWER: Y) CHOLESTEROL IS NOT SYNTHESIZED IN THE HUMAN BODY

(Solution: it is synthesized in the liver)

BONUS

24) CHEMISTRY *Short Answer* What radioactive isotope of this alkaline earth element formed as a fission product of uranium and is of particular importance because it is assimilated in the body much like calcium:

ANSWER: STRONTIUM (ACCEPT: Sr)

TOSS-UP

25) **BIOLOGY** *Multiple Choice* Stems grow longer by creating new cells at their tips, in a region known as the:

- W) terminal division section
- X) terminal mitotic
- Y) shoot apical meristem
- Z) apical terminus

ANSWER: Y) SHOOT APICAL MERISTEM

BONUS

25) **BIOLOGY** *Short Answer* When the body is in a time of stress, which of the 2 divisions of the autonomic nervous system is primarily directing the response?

ANSWER: SYMPATHETIC SYSTEM