

ROUND 2

TOSS-UP

1) CHEMISTRY *Multiple Choice* Which one of the following statements is true about the neutralization of an acid by a base:

- W) the pH decreases when the base is added to the acid
- X) a salt and water are end products
- Y) gas is an end product
- Z) organic compounds are end products

ANSWER: X) A SALT AND WATER ARE END PRODUCTS

BONUS

1) CHEMISTRY *Short Answer* 4.0 liters of oxygen are mixed with 8.0 liters of nitrogen. Identify the solute and solvent in this mixture:

ANSWER: OXYGEN IS THE SOLUTE; NITROGEN IS THE SOLVENT

TOSS-UP

2) PHYSICS *Multiple Choice* Scientists at Brookhaven National Laboratory invented the forerunner of the PET, which was subsequently found to be well-suited for wide use in institutions around the world for which of the following:

- W) metabolic studies and clinical tests
- X) deep sea drilling
- Y) nuclear spallation
- Z) deep space studies

ANSWER: W) METABOLIC STUDIES AND CLINICAL TESTS

BONUS

2) PHYSICS *Short Answer* Considering the specific heat of aluminum is 0.21, iron is 0.10, and lead is 0.03, which metal will show the largest increase in temperature per calorie added to one gram of that metal?

ANSWER: LEAD

(Solution: 0.03 calories is needed to raise one gram of lead 1°C)

TOSS-UP

3) **BIOLOGY** *Multiple Choice* Darwin's finches are an example of evolution of a species by the:

- W) Hardy-Weinberg equilibrium
- X) genetic drift
- Y) founder effect
- Z) macroevolution

ANSWER: Y) FOUNDER EFFECT

BONUS

3) **BIOLOGY** *Short Answer* Order the following from the largest taxonomic group to the smallest group: order, genus, kingdom, class, family, species

ANSWER: KINGDOM, CLASS, ORDER, FAMILY, GENUS, SPECIES

TOSS-UP

4) **ASTRONOMY** *Multiple Choice* What percent of stars in the sky that appear to be single stars are actually binary stars:

- W) about 90%
- X) about 50%
- Y) about 20 %
- Z) about .5%

ANSWER: X) ABOUT 50%

BONUS

4) **ASTRONOMY** *Short Answer* Of the three types of meteorites, which is the most common, in terms of the number of samples, to fall to Earth in recorded history:

ANSWER: STONY METEORITES

TOSS-UP

5) MATH *Multiple Choice* Continuing up the number sequence of natural numbers, prime numbers become which of the following:

- W) non-existent at a certain point
- X) all even after a certain point
- Y) less and less frequent
- Z) more frequent

ANSWER: Y) LESS AND LESS FREQUENT

BONUS

5) MATH *Short Answer* If in a sequence of natural numbers, starting with 2, you begin eliminating every second number after 2, then every third number after 3, then every fourth number after 4, and so on, what type of numbers will be left?

ANSWER: PRIME NUMBERS

TOSS-UP

6) EARTH SCIENCE *Multiple Choice* Which of the following would give the best indication of how a rock was formed:

- W) structure and color
- X) mineralogy and texture
- Y) structure and weight
- Z) shape and size

ANSWER: X) MINERALOGY AND TEXTURE

BONUS

6) EARTH SCIENCE *Short Answer* During which equinoxes are day and night of equal length around the world:

ANSWER: AUTUMNAL AND VERNAL EQUINOXES

TOSS-UP

7) GENERAL SCIENCE *Multiple Choice* Water covers what percent of the earth's surface?

- W) 25%
- X) 55%
- Y) 40%
- Z) 70%

ANSWER: Z) 70%

BONUS

7) GENERAL SCIENCE *Short Answer* Severe annual crop damage to corn is caused by this fungus, which belongs to the order Ustilaginales (pronounced: you-STILL-ig-nay-lees):

ANSWER: SMUT

TOSS-UP

8) GENERAL SCIENCE *Multiple Choice* With few exceptions, a computer infestation program that can replicate by attaching itself to other programs is called a:

- W) worm
- X) Trojan horse
- Y) terminator
- Z) virus

ANSWER: Z) VIRUS

BONUS

8) GENERAL SCIENCE *Short Answer* What does USB stand for?

ANSWER: UNIVERSAL SERIAL BUS

TOSS-UP

9) CHEMISTRY *Multiple Choice* The property of water which permits an insect to “walk” on water is:

- W) viscosity
- X) surface tension
- Y) tensile strength
- Z) turgor pressure

ANSWER: X) SURFACE TENSION

BONUS

9) CHEMISTRY *Short Answer* The reaction of an acid with an alcohol to form an ester and water is called:

ANSWER: ESTERIFICATION

TOSS-UP

10) PHYSICS *Short Answer* What secondary color of light is produced by mixing the primary colors of red and blue?

ANSWER: MAGENTA

BONUS

10) PHYSICS *Short Answer* If the distance separating two charges is doubled, the force between them decreases by what multiple factor?

ANSWER: 4

TOSS-UP

11) **BIOLOGY** *Multiple Choice* Proteins made up of two or more polypeptide chains are said to possess:

- W) a resistance to denaturation
- X) a quaternary structure
- Y) a tertiary structure
- Z) an enzymatic refractory period

ANSWER: X) A QUATERNARY STRUCTURE

BONUS

11) **BIOLOGY** *Multiple Choice* The cytoskeleton of a cell is made of:

- W) microtubules, lignin, and microfilaments
- X) microtubules, intermediate filaments, and microfilaments
- Y) microtubules, flagellin, and microfilaments
- Z) pectins, intermediate filaments, and microfilaments

ANSWER: X) MICROTUBULES, INTERMEDIATE FILAMENTS, AND MICROFILAMENTS

TOSS-UP

12) **ASTRONOMY** *Short Answer* What is the thinnest layer of the Sun's atmosphere?

ANSWER: THE CORONA

BONUS

12) **ASTRONOMY** *Short Answer* What are the only two planets to rotate from East to West?

ANSWER: VENUS AND URANUS

TOSS-UP

13) MATH *Multiple Choice* Which of the following properties would you use to compute the chances of rolling either a 7 or an 11 with a pair of dice:

- W) multiplicative
- X) conditional
- Y) independent
- Z) additive

ANSWER: Z) ADDITIVE

BONUS

13) MATH *Short Answer* Give the rational numbers in the following set:

-8, $-\sqrt{3}$, $1/5$, 0, π (pronounced: pie)

ANSWER: -8, $1/5$, 0

TOSS-UP

14) EARTH SCIENCE *Short Answer* Magma that reached the Earth's surface is called:

ANSWER: LAVA

BONUS

14) EARTH SCIENCE *Short Answer* On the day of the summer solstice in the Southern Hemisphere, the sun can be seen directly overhead at what location around the globe?

ANSWER: TROPIC OF CAPRICORN (ACCEPT: $23\frac{1}{2}^\circ$ SOUTH OF THE EQUATOR)

TOSS-UP

15) GENERAL SCIENCE *Short Answer* The WHO (pronounced: W, H, O) is the abbreviated name for what international scientific organization?

ANSWER: WORLD HEALTH ORGANIZATION

BONUS

15) GENERAL SCIENCE *Short Answer* What type of balance is used for measuring forces of very small magnitudes by how much twist they cause in a fiber or wire?

ANSWER: TORSION BALANCE

TOSS-UP

16) GENERAL SCIENCE *Short Answer* What is the field of GENERAL SCIENCE that deals with designing computer systems that can recognize spoken words:

ANSWER: VOICE RECOGNITION (ACCEPT: SPEECH RECOGNITION)

BONUS

16) GENERAL SCIENCE *Short Answer* What is the *de facto* standard protocol for establishing connections over networks:

ANSWER: TCP/IP (ACCEPT: TRANSMISSION CONTROL PROTOCOL/INTERNET PROTOCOL)

TOSS-UP

17) CHEMISTRY *Multiple choice* Magnesium can exist as three naturally occurring isotopes. These isotopes would all have the same:

- W) atomic weight
- X) number of neutrons
- Y) number of protons
- Z) nucleus

ANSWER: Y) NUMBER OF PROTONS

BONUS

17) CHEMISTRY *Short Answer* Carbohydrates are made of what three elements?

ANSWER: CARBON, HYDROGEN, OXYGEN (ACCEPT: C, H, AND O)

TOSS-UP

18) PHYSICS *Short Answer* What is the name for the physical constant with a value of 6.62×10^{-27} erg seconds?

ANSWER: PLANCK'S CONSTANT

BONUS

18) PHYSICS *Short Answer* If blue light is combined with green light, what color of light is produced?

ANSWER: CYAN (ACCEPT: TURQUOISE)

TOSS-UP

19) **BIOLOGY** *Multiple Choice* A good light microscope has a resolving power of about:

- W) 0.5 millimeters
- X) 0.5 nanometers
- Y) 0.5 microns
- Z) 5 nanometers

ANSWER: Y) 0.5 MICRONS

BONUS

19) **BIOLOGY** *Multiple Choice* In which of the following areas of the human body is the olecranon process found:

- W) hip
- X) wrist
- Y) shoulder
- Z) elbow

ANSWER: Z) ELBOW

TOSS-UP

20) **ASTRONOMY** *Short Answer* How many half-moons are there in a lunar cycle?

ANSWER: 2

BONUS

20) **ASTRONOMY** *Short Answer* The Persid's Meteor Showers are viewed in the State of Maine during what month?

ANSWER: AUGUST

TOSS-UP

21) MATH *Multiple Choice* The surface of a sphere subtends a solid angle of what amount at its center:

- W) π (pronounced: PIE)
- X) 2π (pronounced: 2 PIE)
- Y) 4π (pronounced: 4 PIE)
- Z) $\frac{1}{2}\pi$ (pronounced: one-half PIE)

ANSWER: Y) 4π

BONUS

21) MATH *Short Answer* What is the total angular distance in degrees over a sphere?

ANSWER: 360 DEGREES

TOSS-UP

22) GENERAL SCIENCE *Short Answer* Predicting data values on a graph that fall between two points is most typically referred to as:

ANSWER: INTERPOLATION

BONUS

22) GENERAL SCIENCE *Short Answer* The emerald is the green crystalline form of what common mineral?

ANSWER: BERYL (ACCEPT: BERYLLIUM ALUMINUM SILICATE)

TOSS-UP

23) CHEMISTRY *Multiple Choice* In the chemistry lab, for safety reasons, when a concentrated acid is mixed with water:

- W) the water is always added to the acid
- X) the acid is always added to the water
- Y) these can only be mixed at cold temperatures
- Z) these can never be mixed

ANSWER: X) THE ACID IS ALWAYS ADDED TO THE WATER

BONUS

23) CHEMISTRY *Short Answer* What are the two most common end-products of alcoholic fermentation?

ANSWER: ETHANOL AND CARBON DIOXIDE (ACCEPT: ALCOHOL AND CARBON DIOXIDE OR $C_2H_5OH + CO_2$)

TOSS-UP

24) PHYSICS *Multiple Choice* When a person whirls a rock on the end of a string and maintains it in uniform circular motion, the force exerted on the rock is most accurately referred to as:

- W) centrifugal
- X) centripetal
- Y) rotational
- Z) center fleeing

ANSWER: X) CENTRIPETAL

BONUS

24) PHYSICS *Short Answer* For two objects separated by a distance d , if the mass of one of the objects is doubled, what will happen to the gravitational attraction between them?

ANSWER: IT IS DOUBLED

TOSS-UP

25) **BIOLOGY** *Short Answer* The biological term for programmed cell death is:

ANSWER: APOPTOSIS

BONUS

25) **BIOLOGY** *Multiple Choice* Plant tissues are generally divided into four main types:

W) dermal, vascular, ground, meristematic

X) connective, vascular, ground, meristematic

Y) vascular, ground, meristematic, mesenchymal (pronounced: mes-en-kye-mal)

Z) vascular, ground, meristematic, mesodermal

ANSWER: W) DERMAL, VASCULAR, GROUND, MERISTEMATIC