

ROUND ROBIN 1

TOSS-UP

1) LIFE SCIENCE *Short Answer* Living organisms are often divided into five Kingdoms. In which of the 5 Kingdoms would *E. coli* be classified?

ANSWER: MONERA

BONUS

1) LIFE SCIENCE *Short Answer* What is the binomial scientific genus and species name for humans?

ANSWER: HOMO SAPIENS

TOSS-UP

2) EARTH SCIENCE *Short Answer* The Triassic, Jurassic, and Cretaceous are all periods in what era?

ANSWER: MESOZOIC

BONUS

2) EARTH SCIENCE *Multiple Choice* Which of the following is the correct term for a large crack in ice:

- W) crevice
- X) chasm
- Y) canyon
- Z) crevasse (PRONOUNCE: crah-VAHSS)

ANSWER: Z) CREVASSE

TOSS-UP

3) PHYSICAL SCIENCE *Multiple Choice* What is the density given as specific gravity, of a one centimeter cube of a metal that weighs 5 grams:

- W) .5
- X) 5
- Y) 2
- Z) .2

ANSWER: X) 5

BONUS

3) PHYSICAL SCIENCE *Multiple Choice* Which of the following has the greatest density:

- W) 10 kilogram of pure water
- X) 10 kilogram of aluminum
- Y) 2 kilogram of silver
- Z) 1 kilogram of gold

ANSWER: Z) 1 KILOGRAM OF GOLD

TOSS-UP

4) MATH Peter bought a soda from a vending machine with a dollar bill. The soda cost 35 cents. What is the smallest number of coins he could receive in change if pennies are not included?

ANSWER: FOUR

BONUS

4) MATH What is the integer value of 10^5 divided by 10^3 ?

ANSWER: 100 (DO NOT ACCEPT: 10^2)

TOSS-UP

5) GENERAL SCIENCE Rickets, which was a common disease in the early twentieth century, is caused by a deficiency in what vitamin:

- W) riboflavin
- X) vitamin B12
- Y) vitamin K
- Z) vitamin D

ANSWER: Z) VITAMIN D

BONUS

5) GENERAL SCIENCE *Short answer* Exposure to sunlight converts cholesterol found in human skin into what vitamin?

ANSWER: VITAMIN D

TOSS-UP

6) EARTH SCIENCE Which of the following is present only where benthic organisms reside:

- W) phytoplankton
- X) zooplankton
- Y) diatoms
- Z) deep sea vents

ANSWER: Z) DEEP SEA VENTS

BONUS

6) EARTH SCIENCE *Short Answer* What is the name of the rapid rise of coastal water that accompanies the arrival of a cyclone?

ANSWER: TIDAL SURGE (ACCEPT: STORM OR BASAL SURGE)

TOSS-UP

7) PHYSICAL SCIENCE *Multiple Choice* Which of the following metals is attracted to a magnet?

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

ANSWER: Y) IRON

BONUS

7) PHYSICAL SCIENCE *Multiple Choice* The reaction of hydrocarbons found in such things as wood and paper with oxygen to produce carbon dioxide, water and heat is called:

- W) fission
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- Z) combustion

ANSWER: Z) COMBUSTION

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8) EARTH SCIENCE *Multiple Choice* Metamorphism transforms limestone into a metamorphic rock called:

- W) quartzite
- X) marble
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ANSWER: X) MARBLE

BONUS

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9) LIFE SCIENCE *Multiple Choice* Which of the following is the region of the body where the stapes bone is located:

- W) ankle
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- Y) wrist
- Z) knee

ANSWER: X) EAR

BONUS

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ANSWER: CARTILAGE

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ANSWER: POUNDS per SQUARE INCH

BONUS

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BONUS

11) MATH *Short Answer* Solve the following equation: $9x - 13 = 14$

ANSWER: 3

TOSS-UP

12) GENERAL SCIENCE *Short Answer* On the Centigrade temperature scale give the whole number value that is the closest to absolute zero.

ANSWER: MINUS 273

BONUS

12) GENERAL SCIENCE *Multiple Choice* Which of the following is NOT seen by reflection of sun light:

- W) the moon
- X) Mercury
- Y) Mars
- Z) the north star

ANSWER: Z) THE NORTH STAR

TOSS-UP

13) PHYSICAL SCIENCE *Multiple Choice* Metals that can be hammered into thin sheets are called:

- W) malleable
- X) ductile
- Y) molten
- Z) pure

ANSWER: W) MALLEABLE

BONUS

13) PHYSICAL SCIENCE *Short Answer* A white-colored object illuminated by a blue light will appear as what color to the human eye?

ANSWER: BLUE

TOSS-UP

14) LIFE SCIENCE *Multiple Choice* Which of the following is an intracellular parasite:

- W) malaria
- X) sleeping sickness
- Y) tapeworm
- Z) shigella

ANSWER: W) MALARIA

BONUS

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- Y) molars
- Z) wisdom

ANSWER: X) CANINES

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ANSWER: Y) TWO HIGH TIDES AND TWO LOW TIDES

BONUS

15) EARTH SCIENCE *Multiple Choice* Which of the following is a metamorphic rock:

- W) sandstone
- X) granite
- Y) quartz
- Z) marble

ANSWER: Z) MARBLE

TOSS-UP

16) MATH *Short Answer* What is the cube root of 8?

ANSWER: 2

BONUS

16) MATH *Short Answer* Solve the following equation: $3x + 15 = -12$

ANSWER: -9

TOSS-UP

17) GENERAL SCIENCE *Short Answer* At its greatest possible brightness, which is the brightest planet in the night sky?

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- W) 8.4
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- Z) 2.4

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BONUS

18) EARTH SCIENCE *Multiple Choice* The Earth's mantle is approximately how many miles thick:

- W) 1000
- X) 1200
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- Z) 1800

ANSWER: Z) 1800

TOSS-UP

19) LIFE SCIENCE *Multiple Choice* Which of these organisms is not a kind of worm?

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ANSWER: X) UNDEFINED

BONUS

20) MATH *Short Answer* Find the value of $x^2 - y^2$ when $x = -5$ and $y = -2$:

ANSWER: 21

TOSS-UP

21) PHYSICAL SCIENCE *Short Answer* What is the common scientific term for the ratio of the density of a material to that of water at 4°C

ANSWER: SPECIFIC GRAVITY

BONUS

21) PHYSICAL SCIENCE *Multiple Choice* Starch is made of what simple sugar?

- W) fructose
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ANSWER: A GLACIER

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22) EARTH SCIENCE *Multiple Choice* A flat-topped plateau bordered on all sides by cliffs is called a:

- W) hillock
- X) butte
- Y) drumlin
- Z) karst

ANSWER: X) BUTTE

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ANSWER: $\frac{1}{a}$

BONUS

24) MATH *Short Answer* What is the square root of 169?

ANSWER: 13

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25) EARTH SCIENCE *Multiple choice* The Tropic of Cancer lies at which of the following latitudes:

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- Z) $26\frac{1}{2}^{\circ}$ South

ANSWER: W) $23\frac{1}{2}^{\circ}$ NORTH

BONUS

25) EARTH SCIENCE *Short Answer* Magma that reached the Earth's surface is called what?

ANSWER: LAVA

ROUND ROBIN 2

TOSS-UP

1) MATH *Short Answer* The sum of all the interior angles of a triangle equals how many degrees?

ANSWER: 180°

BONUS

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

ANSWER: 360°

TOSS-UP

2) LIFE SCIENCE *Multiple Choice* During the life-cycle of amphibians, which is not a means through which respiration can occur?

- W) lungs
- X) air bladder
- Y) gills
- Z) skin

ANSWER: X) AIR BLADDER

BONUS

2) LIFE SCIENCE *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

3) PHYSICAL SCIENCE *Multiple Choice* The electrical potential or power of a battery is an expression of its:

- W) amperage
- X) resistance
- Y) conductivity
- Z) voltage

ANSWER: Z) VOLTAGE

BONUS

3) PHYSICAL SCIENCE *Multiple Choice* A typical pair of scissors would be considered:

- W) a class one lever
- X) a class 2 lever
- Y) a class 3 lever
- Z) a form of inclined plane

ANSWER: W) A CLASS ONE LEVER

TOSS-UP

4) GENERAL SCIENCE *Short Answer* How many milliliters are in a liter?

ANSWER: 1000

BONUS

4) GENERAL SCIENCE *Multiple Choice* The Moon orbits the earth about once every:

- W) year
- X) day
- Y) month
- Z) century

ANSWER: Y) MONTH

TOSS-UP

5) MATH *Multiple Choice* The number 0.13 is written with a bar drawn over the last two digits. This means that:

- W) the number terminates at 3
- X) the pair of digits 13 repeats forever
- Y) the number 3 repeats forever
- Z) the number is negative

ANSWER: X) THE PAIR OF DIGITS 13 REPEATS FOREVER

BONUS

5) MATH *Short answer* The following number in Roman numerals is equivalent to what decimal number: C L X X X X I X

ANSWER: 199

TOSS-UP

6) EARTH SCIENCE *Multiple Choice* About what percentage of the Earth surface is covered by water?

- W) 33%
- X) 41%
- Y) 56%
- Z) 71%

ANSWER: Z) 71%

BONUS

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

ANSWER: AUTUMNAL AND VERNAL EQUINOXES

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ROUND ROBIN 3

TOSS-UP

1) LIFE SCIENCE *Multiple Choice* Vestigial (pronounced VES-ti-gee-al) structures:

- W) have no known function in their present owners
- X) function in an analogous fashion in all species
- Y) evolve homologously until functional
- Z) control nervous system functions

ANSWER: W) HAVE NO KNOWN FUNCTION IN THEIR PRESENT OWNERS

BONUS

1) LIFE SCIENCE *Short Answer* *Mallus ioensis* and *Mallus sylvestris* are the genera and species of what common tree?

ANSWER: APPLE

TOSS-UP

2) PHYSICAL SCIENCE *Multiple Choice* What is the decibel scale most often used to measure?

- W) size of bells
- X) magnitude of hurricanes
- Y) loudness of a sound
- Z) brightness of lights

ANSWER: Y) LOUDNESS OF A SOUND

BONUS

46) PHYSICAL SCIENCE *Multiple Choice* What is the name of the lowest energy subshell of an atom where electrons are found:

- W) s
- X) p
- Y) d
- Z) a

ANSWER: W) S

TOSS-UP

3) EARTH SCIENCE *Multiple Choice* Which of the following are the highest of the clouds in the troposphere and are composed entirely of ice crystals:

- W) stratus
- X) cirrus
- Y) cumulus
- Z) altocumulus

ANSWER: X) CIRRUS

BONUS

3) EARTH SCIENCE *Multiple Choice* In the Northern Hemisphere, when is the Earth the greatest distance from the sun:

- W) winter
- X) spring
- Y) summer
- Z) fall

ANSWER: Y) SUMMER

TOSS-UP

4) MATH *Short Answer* The identity element for addition is what number?

ANSWER: 0

BONUS

4) MATH *Short Answer* On a math test, 20 students averaged a score of 80% while 10 students averaged 90%. To the nearest whole number, what is the mean score of the entire class?

ANSWER: 83%

TOSS-UP

5) PHYSICAL SCIENCE *Multiple Choice* Which of the following units is used to measure electric current:

- W) voltage
- X) ohms
- Y) amperes
- Z) watts

ANSWER: Y) AMPERES

BONUS

5) PHYSICAL SCIENCE *Short Answer* What is the current, in amperes, running through a 200-watt light bulb running on a 100 volt power source.

ANSWER: 2 AMPERE

(Solution: current = watts/volts; $200/100 = 2$ ampere)

TOSS-UP

6) GENERAL SCIENCE *Short Answer* What is the scientific term often used by astronomers and geoscientists that refers to the point directly overhead?

ANSWER: ZENITH

BONUS

6) GENERAL SCIENCE *Multiple Choice* The light year is a useful unit of measure for the distance between:

- W) planets
- X) stars
- Y) atoms
- Z) asteroids

ANSWER: X) STARS

TOSS-UP

7) LIFE SCIENCE *Multiple Choice* Which of the following parts of a plant produces pollen:

- W) petal
- X) stamen
- Y) pistil
- Z) sepal

ANSWER: X) STAMEN

BONUS

7) LIFE SCIENCE *Multiple Choice* Plant cells differ from animal cells in that only plant cells possess:

- W) a nucleus
- X) mitochondria
- Y) a cell wall
- Z) lysosomes

ANSWER: Y) A CELL WALL

TOSS-UP

8) MATH *Short Answer* Solve the following equation: $\frac{3x}{4} = -12$

ANSWER: -16

BONUS

8) MATH *Short Answer* Convert the periodic decimal 0.8333 or 0.83 “bar” into a fraction:

ANSWER: 5/6

TOSS-UP

9) EARTH SCIENCE *Multiple Choice* When, in the geological time scale, did dinosaurs roam the Earth in large numbers:

- W) Jurassic
- X) Triassic
- Y) Cretaceous
- Z) Tertiary

ANSWER: W) JURASSIC

BONUS

9) EARTH SCIENCE *Multiple Choice* Meteor showers are composed of:

- W) large pieces of falling rocks
- X) dust and other debris from comets
- Y) falling stars
- Z) solar flares

ANSWER: X) DUST AND OTHER DEBRIS FROM COMETS

TOSS-UP

10) GENERAL SCIENCE *Short Answer* Rounded to the nearest whole number, how many centimeters are in 2 inches ?

ANSWER: 5

BONUS

10) GENERAL SCIENCE *Multiple Choice* Which of the following is NOT true of comets:

- W) they have highly elliptical orbits around the sun
- X) they leave a trail of particles that reflect sun light
- Y) they are made of rocks and condensed gases
- Z) they can only be seen when they pass through the atmosphere

ANSWER: Z) THEY CAN ONLY BE SEEN WHEN THEY PASS THROUGH THE ATMOSPHERE

TOSS-UP

11) EARTH SCIENCE *Short Answer* What is the name for the apparent force that causes hurricanes to be deflected to the right in the Northern hemisphere and to the left in the Southern hemisphere?

ANSWER: THE CORIOLIS EFFECT (ACCEPT: CORIOLIS FORCE)

BONUS

11) EARTH SCIENCE *Multiple Choice* The supercontinent Pangea started to break apart into our present day continents approximately how many million years ago:

- W) 100
- X) 200
- Y) 300
- Z) 400

ANSWER: X) 200

TOSS-UP

12) MATH *Short Answer* Add the following numbers: $0.5 + 0.05 + 0.005$

ANSWER: 0.555

BONUS

12) MATH *Short Answer* Remove the grouping symbols in the following expression: $-3x(2 - 5z)$

ANSWER: $-6x + 15xz$ (ACCEPT: $15xz - 6x$)

TOSS-UP

13) PHYSICAL SCIENCE *Multiple Choice* Which of the following is the least dense at standard temperature and pressure:

- W) 10 kilogram of pure water
- X) 10 kilogram of aluminum
- Y) 2 kilogram of silver
- Z) 1 kilogram of gold

ANSWER: W) 10 kilogram of pure water

BONUS

13) PHYSICAL SCIENCE *Short Answer* How many electron does the *s* subshell of an atom hold?

ANSWER: 2

TOSS-UP

14) LIFE SCIENCE *Multiple Choice* Which of the following is the scientific name for the knee cap:

- W) fibula
- X) malleus
- Y) patella
- Z) scapula

ANSWER: Y) PATELLA

BONUS

14) LIFE SCIENCE *Short Answer* Organize the following 3 tooth layers from the outermost to the innermost of a tooth: dentin, enamel, pulp

ANSWER: ENAMEL, DENTIN, PULP

TOSS-UP

15) GENERAL SCIENCE *Short Answer* How much does one cubic centimeter of water weigh at standard temperature and pressure?

ANSWER: 1 gram

BONUS

15) GENERAL SCIENCE *Multiple Choice* Craters on the moon is evidence of :

- W) lakes that once existed
- X) visits from other life forms
- Y) asteroid impacts
- Z) plate tectonics

ANSWER: Y) ASTEROID IMPACTS

TOSS-UP

16) PHYSICAL SCIENCE *Multiple Choice* The particles in an atom that determine which element it is are the:

- W) nuclei
- X) electrons
- Y) neutrons
- Z) protons

ANSWER: Z) PROTONS

BONUS

16) PHYSICAL SCIENCE *Multiple Choice* All metals:

- W) melt at high temperatures
- X) conduct heat and electricity
- Y) contain iron
- Z) react with air and water

ANSWER: X) CONDUCT HEAT AND ELECTRICITY

TOSS-UP

17) LIFE SCIENCE *Multiple Choice* Which of the following parts of a cell is most directly responsible for synthesizing proteins:

- W) ribosomes
- X) endoplasmic reticulum
- Y) vacuoles
- Z) lysosomee

ANSWER: W) RIBOSOMES

BONUS

17) LIFE SCIENCE *Short Answer* This structure that develops in the wall of the uterus functions in the pregnant mammals to transfer nourishment and oxygen and remove wastes from the developing offspring.

ANSWER: PLACENTA

TOSS-UP

18) EARTH SCIENCE *Short Answer* Which equinox marks the beginning of spring in the Northern Hemisphere?

ANSWER: VERNAL EQUINOX

BONUS

18) EARTH SCIENCE *Multiple Choice* Steep-sided volcanoes such as Mounts Rainier, Hood, and Fuji, are examples of what kind of volcanoes:

- W) stratovolcanoes
- X) tephra cone volcanoes
- Y) shield volcanoes
- Z) tower volcanoes

ANSWER: W) STRATOVOLCANOES

TOSS-UP

19) GENERAL SCIENCE *Multiple Choice* The Sahara Desert in Africa is what type of desert?

- W) subtropical
- X) continental
- Y) rain shadow
- Z) coastal

ANSWER: W) SUBTROPICAL

BONUS

19) GENERAL SCIENCE *Short Answer* What are the 4 physical states of matter?

ANSWER: SOLID, LIQUID, GAS, PLASMA

TOSS-UP

20) LIFE SCIENCE *Multiple Choice* Which of the following is the scientific name for the thigh bone:

- W) tibia
- X) femur
- Y) fibula
- Z) humerus

ANSWER: X) FEMUR

BONUS

20) LIFE SCIENCE *Short Answer* When a nerve message reaches the end of an axon it sends a message or impulse across the space between the nerves to continue its message to the next nerve. What is the space across which the message is sent usually called?

ANSWER: SYNAPSE

TOSS-UP

21) PHYSICAL SCIENCE *Multiple Choice* When a car turns a corner on dry pavement, the wheels do not slide sideways and the car completes the turn due to what interaction between the tires and the pavement?

- W) friction
- X) torque
- Y) drag
- Z) acceleration

ANSWER: W) FRICTION

BONUS

21) PHYSICAL SCIENCE *Multiple Choice* Complex carbohydrates are called:

- W) polypeptides
- X) polynuclides
- Y) polypropylenes
- Z) polysaccharides

ANSWER: Z) POLYSACCHARIDES

TOSS-UP

22) MATH *Short Answer* What kind of fraction has the absolute value of the numerator greater than the denominator?

ANSWER: IMPROPER FRACTION

BONUS

22) MATH *Multiple Choice* Which of the following numbers is divisible by 3:

- W) 5,163
- X) 2,465
- Y) 1,315
- Z) 313

ANSWER: W) 5,163

TOSS-UP

23) EARTH SCIENCE *Short Answer* With a Mohs' hardness of 1, what is the softest mineral known?

ANSWER: TALC

BONUS

23) EARTH SCIENCE *Multiple Choice* The first scientist to propose the hypothesis of the past existence of the supercontinent Pangea was:

- W) James Hutton
- X) John Filmore Hayford
- Y) Charles Darwin
- Z) Alfred Wegener

ANSWER: Z) ALFRED WEGENER

TOSS-UP

24) GENERAL SCIENCE *Short Answer* What vitamin is the most directly associated with the disease scurvy?

ANSWER: VITAMIN C

BONUS

24) GENERAL SCIENCE *Multiple Choice* Which of the following is the best estimate of what a gallon of water weighs in kilograms?

- W) 2 kilograms
- X) 4 kilograms
- Y) 6 kilograms
- Z) 8 kilograms

ANSWER: X) 4 KILOGRAMS

TOSS-UP

25) MATH *Short Answer* What is the name for a set that contains no elements?

ANSWER: EMPTY SET

BONUS

25) MATH *Short Answer* Solve the following expression: $2\sqrt{25} + 25 \div 5$

ANSWER: 15

ROUND ROBIN 4

TOSS-UP

1) PHYSICAL SCIENCE *Multiple Choice* A child's seesaw would be considered:

- W) a complex machine
- X) a form of inclined plane
- Y) a compound lever
- Z) a class 1 lever

ANSWER: Z) A CLASS ONE LEVER

BONUS

1) PHYSICAL SCIENCE *Short Answer* A 100-watt light bulb is lighted by a 100 volt power source. What is the current, in amperes, running through the bulb?

ANSWER: 1 AMPERE

(Solution: current = watts/volts; $100/100 = 1$ ampere)

TOSS-UP

2) LIFE SCIENCE *Multiple Choice* Which of the following is the scientific name for the part of the human brain where higher brain operations occur such as thinking, imagination, mathematical reasoning and language:

- W) cerebral cortex
- X) cerebellum
- Y) medulla oblongata
- Z) hypothalamus

ANSWER: W) CEREBRAL CORTEX

BONUS

2) LIFE SCIENCE *Short Answer* What is the common botanical term for the response a cell or plant has towards or away from a stimulus?

ANSWER: TAXIS

TOSS-UP

3) GENERAL SCIENCE *Short Answer* What layer of the Sun's atmosphere is immediately interior to the corona?

ANSWER: THE CHROMOSPHERE

BONUS

3) GENERAL SCIENCE *Short Answer* How many angstroms are in 1 micron?

ANSWER: 10,000

TOSS-UP

4) LIFE SCIENCE *Multiple Choice* What is the joint that is formed by the articulation of the tibia, fibula, and femur?

- W) wrist
- X) knee
- Y) elbow
- Z) ankle

ANSWER: X) KNEE

BONUS

4) LIFE SCIENCE *Multiple Choice* The exchange of gases between blood and the tissue occurs normally in:

- W) venules
- X) arterioles
- Y) veins
- Z) capillaries

ANSWER: Z) CAPILLARIES

TOSS-UP

5) MATH *Short Answer* What does 12 times 13 divided by 2 equal?

ANSWER: 78

BONUS

5) MATH *Short Answer* Four factorial equals what number?

ANSWER: 24

TOSS-UP

6) EARTH SCIENCE *Short Answer* During which month does the vernal equinox occur?

ANSWER: MARCH

BONUS

6) EARTH SCIENCE *Short Answer* The temperature at which the relative humidity reaches 100% and condensation starts is called the:

ANSWER: DEW POINT

TOSS-UP

7) GENERAL SCIENCE *Short Answer* Sigmund Freud proposed the idea that the subconscious mind existed in three separate divisions two of which he called the ego and the superego. What was the third?

ANSWER: THE ID

BONUS

7) GENERAL SCIENCE *Multiple Choice* Galaxies are:

- W) clouds of gases around stars
- X) clusters of billion of stars
- Y) rare in the universe
- Z) always spherical in shape

ANSWER: X) CLUSTERS OF BILLION OF STARS

TOSS-UP

8) PHYSICAL SCIENCE *Short Answer* The amount of heat needed to increase the temperature of 1.00 gram of water from 14.5°C to 15.5°C is defined as what unit of measurement?

ANSWER: CALORIE

BONUS

8) PHYSICAL SCIENCE *Short Answer* What is the chemical formula for hydrogen peroxide?

ANSWER: H₂O₂

TOSS-UP

9) EARTH SCIENCE *Multiple Choice* Which of the following minerals best illustrates the property of cleavage:

- W) quartz
- X) diamond
- Y) topaz
- Z) mica

ANSWER: Z) MICA

BONUS

9) EARTH SCIENCE *Multiple Choice* Based on how it was formed, slate is classified as what type of rock:

- W) igneous
- X) sedimentary
- Y) metamorphic
- Z) volcanic

ANSWER: Y) METAMORPHIC

TOSS-UP

10) MATH *Short Answer* What is the name of the famous theorem of geometry that states the sum of the squares of a right triangle is equal to the square of the hypotenuse?

ANSWER: PYTHAGOREAN THEOREM (ACCEPT: PYTHAGOREAN OR PYTHAGORAS)

BONUS

10) MATH *Short Answer* What is the following Roman Numeral number equal to in an Arabic number: MCMLXI

ANSWER: 1961

TOSS-UP

11) PHYSICAL SCIENCE *Multiple Choice* The mass of a quantity of matter divided by its volume provides which specific property?

- W) weight
- X) specific gravity
- Y) density
- Z) malleability

ANSWER: Y) DENSITY

BONUS

11) PHYSICAL SCIENCE *Short Answer* Assuming friction is negligible, if a lever has a mechanical advantage of 5, how much effort in newtons is needed to lift a 10 newton load?

ANSWER: 2 NEWTONS

(Solution: Force = resistance / mechanical advantage)

TOSS-UP

12) LIFE SCIENCE *Multiple Choice* In 1665, what person, using a microscope he built, observed perforations in plant stems, which he called cells:

- W) Robert Hooke
- X) Anton Van Leewenhoek
- Y) Carolus Linnaeus
- Z) Theodor Schwann

ANSWER: W) ROBERT HOOKE

BONUS

12) LIFE SCIENCE *Short Answer* What are the four main human blood types?

ANSWER: O, A, B, AND AB

TOSS-UP

13) MATH *Short Answer* Solve the following equation: $\frac{x}{6} = -8$

ANSWER: -48

BONUS

13) MATH *Short Answer* Find the area of a circle when the radius equals 10:

ANSWER: 314

(Solution: $A = \pi r^2$)

TOSS-UP

14) EARTH SCIENCE *Short Answer* What is the name of the phenomenon that causes an accumulation of heat in the lower atmosphere because of the absorption of long wavelength radiation from the Earth's surface?

ANSWER: GREENHOUSE EFFECT

BONUS

14) EARTH SCIENCE *Short Answer* A meteor that reaches the surface of the Earth is more accurately called a:

ANSWER: METEORITE

TOSS-UP

15) LIFE SCIENCE *Multiple Choice* Which of the following is the region of the body where the thyroid gland is located:

- W) neck
- X) abdomen
- Y) brain
- Z) arm pit

ANSWER: W) NECK

BONUS

15) LIFE SCIENCE *Short Answer* Encephalitis is an inflammation of what organ?

ANSWER: BRAIN

TOSS-UP

16) GENERAL SCIENCE *Short Answer* Ring, Helix, Dumbbell and Veil are all names of what specific type of heavenly bodies?

ANSWER: NEBULA

BONUS

16) GENERAL SCIENCE *Short Answer* Rounded to the nearest whole number, what is the temperature in Fahrenheit of a substance at 100°C ?

ANSWER: 212°

TOSS-UP

17) EARTH SCIENCE *Short Answer* Which equinox marks the moment when fall begins in the Northern Hemisphere?

ANSWER: AUTUMNAL EQUINOX

BONUS

17) EARTH SCIENCE *Multiple Choice* Underwater volcanoes that have a flat top are called:

- W) seamounts
- X) island arcs
- Y) abyssal mountains
- Z) guyots

ANSWER: Z) GUYOTS

TOSS-UP

18) MATH *Short Answer* What is the smallest two-digit whole number?

ANSWER: 10

BONUS

18) MATH *Short Answer* On your first math test you scored a 56% and on the second test you scored 70%. By what percentage did you increase your score?

ANSWER: 25%

(Solution = $70 - 56 = 14$, $14/56 = 25\%$)

TOSS-UP

19) GENERAL SCIENCE *Short Answer* What term do physicists and engineers use most commonly to describe a change in the velocity of an object?

ANSWER: ACCELERATION

BONUS

19) GENERAL SCIENCE *Multiple Choice* Which list is out of order of closest to furthest distance from the sun:

- W) Mercury, Venus, Earth
- X) Jupiter, Saturn, Neptune
- Y) Venus, Mars, Earth
- Z) Mercury, Jupiter, Pluto

ANSWER: Y) VENUS, MARS, EARTH

TOSS-UP

20) PHYSICAL SCIENCE *Short Answer* A color made from the addition of two primary colors is called a:

ANSWER: SECONDARY COLOR

BONUS

20) PHYSICAL SCIENCE *Multiple Choice* At 100 degrees Fahrenheit, which of the following substances would feel hottest to touch?

- W) wood
- X) water
- Y) sand
- Z) gold

ANSWER: Z) GOLD

TOSS-UP

21) GENERAL SCIENCE *Short Answer* In a compound light microscope, the lens closest to the specimen is usually called the

ANSWER: OBJECTIVE

BONUS

21) GENERAL SCIENCE *Short Answer* What is the nearest star to Earth in the Milky Way?

ANSWER: THE SUN

TOSS-UP

22) PHYSICAL SCIENCE *Multiple Choice* What property of waves allows them to bend around the edges of obstacle:

- W) reflection
- X) diffraction
- Y) deflection
- Z) dispersion

ANSWER: X) DIFFRACTION

BONUS

22) PHYSICAL SCIENCE *Short Answer* For a toaster that draws 12 amps on a 120 volt line, what is the resistance of the toaster?

ANSWER: 10 OHMS

(Solution: $I = V/R$, $R = V/I$, $R = 120/12 = 10$)

TOSS-UP

23) LIFE SCIENCE *Multiple Choice* Which of the following is not a case of symbiosis:

- W) parasitism
- X) commensalism
- Y) mutualism
- Z) formatism

ANSWER: Z) FORMATISM

BONUS

23) LIFE SCIENCE *Short Answer* What is the name of the protein which is primarily responsible for the varying shades of color in human skin and increases in production after exposure to sunlight.

ANSWER: MELANIN

TOSS-UP

24) EARTH SCIENCE *Short Answer* What is the name of a mixture of molten rock, suspended mineral grains, and dissolved gases that forms within the crust or mantle of the Earth when temperatures are sufficiently high:

ANSWER: MAGMA (DO NOT ACCEPT: LAVA)

(Solution: magma becomes lava when it erupts at the surface)

BONUS

24) EARTH SCIENCE *Multiple Choice* In what geological period did the first organisms with shells first become abundant:

- W) Precambrian
- X) Cambrian
- Y) Devonian
- Z) Permian

ANSWER: X) CAMBRIAN

TOSS-UP

25) MATH *Short Answer* What is the standard formula for the surface area of a sphere?

ANSWER: $4\pi r^2$

BONUS

25) MATH *Short Answer* Multiply the following 5 numbers: $(-2)(-5)(-4)(-3)(-1)$

ANSWER: -120

ROUND ROBIN 5

TOSS-UP

1) **PHYSICAL SCIENCE** *Multiple Choice* When an airplane's ailerons move in opposite directions they usually cause a plane to:

- W) pitch
- X) yaw
- Y) roll
- Z) stall

ANSWER: Y) ROLL

BONUS

1) **PHYSICAL SCIENCE** *Multiple Choice* Calcium, strontium, and barium are commonly called what kind of elements?

- W) halides
- X) inert
- Y) alkali metals
- Z) alkaline earth

ANSWER: Z) ALKALINE

TOSS-UP

2) **EARTH SCIENCE** *Multiple Choice* In which of the geological time periods, did dinosaurs first appear:

- W) Jurassic
- X) Triassic
- Y) Cretaceous
- Z) Tertiary

ANSWER: X) TRIASSIC

BONUS

2) **EARTH SCIENCE** *Short Answer* In what layer of the Earth's atmosphere does most of our weather occur?

ANSWER: TROPOSPHERE

TOSS-UP

3) MATH *Short Answer* If 2 sides of a quadrilateral are parallel and the other sides are equal but NOT parallel, what is the quadrilateral known as?

ANSWER: TRAPEZOID

BONUS

3) MATH *Short Answer* Find the area of a triangle whose base is 8 and whose height is 6:

ANSWER: 24

(Solution: $A = 1/2bh$)

TOSS-UP

4) LIFE SCIENCE *Multiple Choice* A series of amino acids joined together will make a:

- W) polysaccharide
- X) DNA
- Y) sugar
- Z) protein

ANSWER: Z) PROTEIN

BONUS

4) LIFE SCIENCE *Multiple Choice* When a nerve message reaches the end of an axon it sends a message or impulse across the space between the nerves to continue its message to the next nerve by a substance best known as:

- W) synaptic nodes
- X) neuromotor stimuli
- Y) neurotransmitters
- Z) intersynaptic dosimeters

ANSWER: Y) NEUROTRANSMITTERS

TOSS-UP

5) **PHYSICAL SCIENCE** *Multiple Choice* Which of the following moves in the form of a longitudinal compression wave:

- W) ocean wave
- X) sound wave
- Y) light wave
- Z) electromagnetic wave

ANSWER: X) SOUND WAVE

BONUS

5) **PHYSICAL SCIENCE** *Short Answer* What is the resistance of an electric drill that draws 8 amps on a 120 volt line?

ANSWER: 15 OHMS

(Solution: $I = V/R$, $R = V/I$, $R = 120/8 = 15$)

TOSS-UP

6) **GENERAL SCIENCE** *Short Answer* Ergot, *Amanita muscaris*, *Penicillium* and smut are all organisms that belong to which one of the five classical Kingdoms of life?

ANSWER: FUNGI

BONUS

*6) **GENERAL SCIENCE** *Multiple Choice* When the moon appears through the night as a thin crescent, the sun's light:

- W) is being blocked by the earth
- X) still illuminates about half the surface of the moon
- Y) is only hitting the crescent region
- Z) only shines during the day

ANSWER: X) STILL ILLUMINATES ABOUT HALF THE SURFACE OF THE MOON

TOSS-UP

7) **MATH** *Multiple Choice* If a biker traveled at an average speed of 3 meters/second for 100 seconds, the length of the biker's path was about:

- W) 33 meters
- X) 300 meters
- Y) 100 meters
- Z) 1 kilometer

ANSWER: X) 300 METERS

BONUS

7) **MATH** *Short Answer* If a perfect number is an integer equal to the sum of all its divisors, except the number itself, what is the lowest perfect number?

ANSWER: 6

(Solution: $6 = 1 + 2 + 3$)

TOSS-UP

8) **LIFE SCIENCE** *Multiple Choice* Most animal eukaryotic cells have:

- W) a cell wall, nucleus, and cytoplasm
- X) a plasma membrane, nucleus, and cytoplasm
- Y) a cell wall, nucleus, and nucleolus
- Z) a cell wall, nucleus, and mitochondrion

ANSWER: X) A PLASMA MEMBRANE, NUCLEUS, AND CYTOPLASM

BONUS

8) **LIFE SCIENCE** *Short Answer* What is the term used by Charles Darwin that he believed was the principle mechanism of evolution and way that nature chose certain members of a population to survive over others?

ANSWER: NATURAL SELECTION

TOSS-UP

9) GENERAL SCIENCE *Short Answer* In order from the beginning, what are the first 5 letters of the Greek alphabet?

ANSWER: alpha, beta, gamma, delta, epsilon

BONUS

9) GENERAL SCIENCE *Short Answer* Rounded to the nearest whole number, what is the temperature in Fahrenheit of a substance at -40°C ?

ANSWER: -40

TOSS-UP

10) MATH *Short Answer* Identify the quotient, dividend, and divisor for $15 \div 3$:

ANSWER: QUOTIENT = 5; DIVIDEND = 15; DIVISOR = 3

BONUS

10) MATH *Short Answer* Give the product of $(x + 7)^2$ in standard form:

ANSWER: $x^2 + 14x + 49$

TOSS-UP

11) **PHYSICAL SCIENCE** *Multiple Choice* Ultrasonic sound frequencies are typically considered to be

- W) above 20,000 kilohertz
- X) below 20,000 kilohertz
- Y) above 20,000 Hertz
- Z) below 20,000 Hertz

ANSWER: Y) ABOVE 20,000 HERTZ

BONUS

11) **PHYSICAL SCIENCE** *Multiple Choice* Predict which object made of the following metal will sink in a pool of Mercury, which has a density 13.5 grams per cubic centimeter:

- W) aluminum, which has a density of 2.6 grams per cubic centimeter
- X) iron, which has a density of 7.9 grams per cubic centimeter
- Y) lead, which has a density of 11.34 grams per cubic centimeter
- Z) uranium, which has a density of 19.5 grams per cubic centimeter

ANSWER: Z) URANIUM, WHICH HAS A DENSITY OF 19.5 GRAMS PER CUBIC CENTIMETER

TOSS-UP

12) **EARTH SCIENCE** *Short Answer* In what layer of the Earth's atmosphere does most of our weather occur?

ANSWER: TROPOSPHERE

BONUS

12) **EARTH SCIENCE** *Short Answer* Lines on a weather map connecting places of equal air pressure are called:

ANSWER: ISOBARS

TOSS-UP

13) LIFE SCIENCE *Short Answer* What main artery carries oxygenated blood immediately away from left ventricle of the heart?

ANSWER: AORTA

BONUS

13) LIFE SCIENCE *Short Answer* What is the vector that transmits Rocky Mountain Spotted Fever to humans?

ANSWER: THE TICK (ACCEPT: DERMACENTAR)

TOSS-UP

14) GENERAL SCIENCE *Short Answer* On the Kelvin temperature scale give the whole number value that is the closest to absolute zero.

ANSWER: 0

BONUS

14) GENERAL SCIENCE *Multiple Choice* Stars appear to have different colors because they have different:

- W) distances
- X) ages
- Y) temperatures
- Z) names

ANSWER: Y) TEMPERATURES

TOSS-UP

15) MATH *Short Answer* Solve the following equation: $-4 + x = -5$

ANSWER: -1

BONUS

15) MATH *Short Answer* Give the median for the following data set: 32, 59, 68, 70, 84

ANSWER: 68

(Solution: mean or average is 62.6; median is middle, not average)

TOSS-UP

16) EARTH SCIENCE *Short Answer* Identify the type of structure associated with the following man-made structures in the United States: Hungry Horse, Yellowtail, Glen Canyon, Grand Coulee, and Hoover

ANSWER: DAMS

BONUS

16) EARTH SCIENCE *Short Answer* What is the name of the boundary between the troposphere and the stratosphere?

ANSWER: TROPOPAUSE

TOSS-UP

17) PHYSICAL SCIENCE *Multiple Choice* The electrons that are shared in chemical bonds between atoms are most accurately called:

- W) inner electrons
- X) quantum electrons
- Y) valence electrons
- Z) jumping electrons

ANSWER: Y) VALENCE ELECTRONS

BONUS

17) PHYSICAL SCIENCE *Multiple Choice* In grams per milliliter, which of the following is closest to the density of ice:

- W) 0.26
- X) 0.92
- Y) .99
- Z) 3.00

ANSWER: Y) .99

TOSS-UP

18) LIFE SCIENCE *Short Answer* What is the protein found in red blood cells that carries oxygen:

ANSWER: HEMOGLOBIN

BONUS

18) LIFE SCIENCE *Short Answer* What is the vector for the germ which caused the black plague?

ANSWER: FLEA

TOSS-UP

19) EARTH SCIENCE *Short Answer* With a Mohs' hardness of 10, what is the hardest mineral known?

ANSWER: DIAMOND

BONUS

19) EARTH SCIENCE *Short Answer* Most of the ozone in the Earth's atmosphere is present in which layer?

ANSWER: STRATOSPHERE

TOSS-UP

20) GENERAL SCIENCE *Short Answer* What is the mineral that has tricked so many people into thinking it was the real precious metal gold that its common name is "fool's gold" ?

ANSWER: IRON PYRITE

BONUS

20) GENERAL SCIENCE *Multiple Choice* Early astronomers observed lights that wandered among the stars, today we know these are:

- W) sun spots
- X) asteroid belts
- Y) constellations
- Z) planets

ANSWER: Z) PLANETS

TOSS-UP

21) GENERAL SCIENCE *Short Answer* What is the term used for the unusual infectious agents that cause mad cow disease?

ANSWER: PRIONS

BONUS

21) GENERAL SCIENCE *Short Answer* George Washington Carver found over 100 uses for the organic molecules derived from what common plant?

ANSWER: PEANUT

TOSS-UP

22) EARTH SCIENCE *Short Answer* What is the name of the form of oxygen that is present in the atmosphere that protects life on Earth by absorbing much of the ultraviolet radiation from the sun?

ANSWER: OZONE (ACCEPT: O₃)

BONUS

22) 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

23) MATH *Short Answer* The identity element for multiplication is what number?

ANSWER: 1

BONUS

23) MATH *Short Answer* After a discount of 20%, the price of a motorcycle was \$10,000. What was the original price of the motorcycle?

ANSWER: \$12,500.00

TOSS-UP

24) LIFE SCIENCE *Short Answer* Mendel did most of his original experimentation using this type of plant:

ANSWER: PEA

BONUS

24) LIFE SCIENCE *Short Answer* Where is intercellular fluid normally found?

ANSWER: OUTSIDE OF CELLS (ACCEPT: IN BETWEEN CELLS OR IN THE INTERSTITIUM)

TOSS-UP

25) **PHYSICAL SCIENCE** *Short Answer* Whole multiples of the fundamental tone are usually called:

ANSWER: HARMONICS (ACCEPT: HARMONIC OVERTONES OR PERFECT OVERTONES)

BONUS

25) **PHYSICAL SCIENCE** *Short Answer* If an atom of fluorine has an atomic number of 9 and an atomic mass of 18.998 , how many protons and neutrons are in the nucleus?

ANSWER: 9 PROTONS, 10 NEUTRONS

ROUND ROBIN 6

TOSS-UP

1) **LIFE SCIENCE** *Multiple Choice* Which of the following accounts for the largest increase in cancer death rate in the USA between the years 1900 and 1990:

- W) lung
- X) breast
- Y) colon
- Z) stomach

ANSWER: W) LUNG

BONUS

1) **LIFE SCIENCE** *Multiple Choice* The structure of DNA proposed by Watson and Crick was partly based on the x-ray work of:

- W) Louis Pasteur
- X) Rosalind Franklin
- Y) Linus Pauling
- Z) Eleonore Rubinstein

ANSWER: X) ROSALIND FRANKLIN

TOSS-UP

2) **PHYSICAL SCIENCE** *Multiple Choice* If light is passed through two pin holes and the patterns allowed to overlap on a wall, the pattern produced by the intersection of waves is called:

- W) an intersection pattern
- X) an interference pattern
- Y) an arcing pattern
- Z) a construction pattern

ANSWER: X) AN INTERFERENCE PATTERN

BONUS

2) **PHYSICAL SCIENCE** *Short Answer* Add a second proton and two neutrons to the hydrogen nucleus and you have which element?

ANSWER: HELIUM (ACCEPT: He)

TOSS-UP

*3) **GENERAL SCIENCE** *Multiple Choice* To guard against sparks causing a fire, mechanics aboard submarines during World War II often used tools made from which of the following:

- W) chrome plated steel
- X) vanadium
- Y) cold rolled steel
- Z) bronze

ANSWER: Z) BRONZE

BONUS

*3) **GENERAL SCIENCE** *Multiple Choice* The shape of galaxies, stars, planets and their orbits is mostly attributed to:

- w) light
- x) matter
- y) electricity
- z) gravity

ANSWER: Z) GRAVITY

TOSS-UP

4) **MATH** *Short Answer* What is the sum of the internal angles of a pentagon:

ANSWER: 540°

BONUS

46 **MATH** *Multiple Choice* Assuming a year in a dog's life is equivalent to 7 years of a human's life, what is 1 hour of a dog's life approximately equivalent to in a human's life?

- W) 3 ½ hours
- X) 7 hours
- Y) 5 hours
- Z) 4 ½ days

ANSWER: X) 7 HOURS

TOSS-UP

5) MATH *Multiple Choice* The longest straight line that can be drawn inside a circle is called its:

- W) radius
- X) vector
- Y) tangent
- Z) diameter

ANSWER: Z) DIAMETER

BONUS

5) MATH *Short Answer* If you walk north for 3 miles along 1st street and make a 90 degree right turn east onto B street and then walk for another 4 miles what would be the shortest distance back to where you started, if you could walk in a straight line?

ANSWER: 5 MILES

(Solution : 3, 4, 5 right triangle)

TOSS-UP

6) EARTH SCIENCE *Multiple Choice* If air masses move toward mountains from the west, most of the moisture will fall on the

- W) north side of the mountains
- X) south side of the mountains
- Y) west side of the mountains
- Z) east side of the mountains

ANSWER: Y) WEST SIDE OF THE MOUNTAINS

BONUS

6) EARTH SCIENCE *Short Answer* Order the following periods of geological time from oldest to youngest: Jurassic, Cambrian, Triassic,

ANSWER: CAMBRIAN; TRIASSIC; JURASSIC

TOSS-UP

7) PHYSICAL SCIENCE *Short Answer* Which planet is the brightest when viewed from Earth?

ANSWER: VENUS

BONUS

7) PHYSICAL SCIENCE *Short Answer* If an atom of carbon has an atomic number of 6 and an atomic mass of 12.01, how many protons and neutrons are in the nucleus?

ANSWER: 6 PROTONS, 6 NEUTRONS

TOSS-UP

8) LIFE SCIENCE *Short Answer* In the traditional 5 Kingdom classification of organisms, four of the 5 Kingdoms are Animalia, Plantae, Fungi, and Protista. What is the fifth?

ANSWER: MONERA

BONUS

2) LIFE SCIENCE *Short Answer* Give the scientific names for the four chambers of the human heart:

ANSWER: LEFT VENTRICLE, RIGHT VENTRICLE, LEFT ATRIUM, RIGHT ATRIUM
(ACCEPT IN ANY ORDER)

TOSS-UP

9) EARTH SCIENCE *Multiple Choice* Which of the following dominates the gasses in the Earth's atmosphere, making up some 78% of the air by volume:

- W) nitrogen
- X) oxygen
- Y) helium
- Z) hydrogen

ANSWER: W) NITROGEN

BONUS

9) EARTH SCIENCE *Multiple Choice* Metamorphism transforms limestone into a metamorphic rock called:

- W) quartzite
- X) marble
- Y) hornfel
- Z) granite

ANSWER: X) MARBLE

TOSS-UP

10) GENERAL SCIENCE *Short Answer* This powerful telescope weighs about 11 tons, has a primary mirror 7.9 feet in diameter, and orbits about 380 miles above the earth:

ANSWER: THE HUBBLE TELESCOPE

BONUS

10) GENERAL SCIENCE *Multiple Choice* Which of the following is NOT commonly thought of as an input device:

- W) scanner
- X) printer
- Y) touch-screen video screen
- Z) speaker

ANSWER: X) PRINTER

TOSS-UP

11) **LIFE SCIENCE** *Multiple Choice* Which of the following is a feeding structure in arachnids:

- W) dentipalps
- X) radula
- Y) proboscis
- Z) chelicerae (PRONOUNCED Chill-iss-er-ah)

ANSWER: Z) CHELICERAE

BONUS

11) **LIFE SCIENCE** *Multiple Choice* In humans, ovulation usually occurs how many days before the start of the next menstrual period:

- W) 4
- X) 9
- Y) 14
- Z) 21

ANSWER: Y) 14

TOSS-UP

10) **PHYSICAL SCIENCE** *Short Answer* What color light is produced by adding equal amounts of red, green, and blue light?

ANSWER: WHITE

BONUS

10) **PHYSICAL SCIENCE** *Short Answer* Name the most common disaccharide, known as milk sugar, that is found in milk.

ANSWER: LACTOSE

TOSS-UP

13) **MATH** *Short Answer* Convert $3/20$ into a percentage:

ANSWER: 15%

(Solution = $15/100 = 15\%$)

BONUS

13) **MATH** *Short Answer* Solve the following equation: $6x - 8 = 8 - 10x$

ANSWER: 1

(ACCEPT: $x = 1$)

TOSS-UP

14) **LIFE SCIENCE** *Multiple Choice* Which of the following plants traps and digests insects:

- W) begonia
- X) bird of paradise
- Y) sun dew
- Z) lady's slipper

ANSWER: Y) SUN DEW

BONUS

14) **LIFE SCIENCE** *Multiple Choice* In human nerves, the nerve impulse or message occurs primarily because of the movement of ions of what two elements across the cell membranes of nerves:

- W) sodium and potassium
- X) potassium and calcium
- Y) calcium and sodium
- Z) calcium and magnesium

ANSWER: W) SODIUM AND POTASSIUM

TOSS-UP

*15) **GENERAL SCIENCE** *Multiple Choice* An autoclave would often be used by which of the following scientists?

- W) cosmologist
- X) microbiologist
- Y) paleontologist
- Z) philologist

ANSWER: X) MICROBIOLOGIST

BONUS

15) **GENERAL SCIENCE** *Short Answer* Which ones, if any, of the following elements are liquids at standard temperature and pressure: chlorine, bromine, mercury, selenium?

ANSWER: BROMINE AND MERCURY

TOSS-UP

16) **EARTH SCIENCE** *Multiple Choice* What happened in 1815 to cause that year to be named “the year without a summer?”

- W) a large meteor struck the Earth
- X) a large volcano erupted
- Y) there was a radical shift in the jet-stream southward
- Z) several large earthquakes occurred simultaneously around the globe

ANSWER: X) A LARGE VOLCANO ERUPTED

BONUS

16) **EARTH SCIENCE** *Multiple Choice* When, in the geologic column, did dinosaurs become extinct?

- W) at the Cretaceous-Tertiary boundary
- X) at the Jurassic-Cretaceous boundary
- Y) at the Triassic-Jurassic boundary
- Z) at the Permian-Triassic boundary

ANSWER: W) AT THE CRETACEOUS-TERTIARY BOUNDARY

TOSS-UP

17) **GENERAL SCIENCE** *Multiple Choice* The common mineral beryl, when found in its green crystalline form, is most commonly known as what gem stone:

- W) emerald
- X) opal
- Y) malachite
- Z) septantaine

ANSWER: W) EMERALD

BONUS

17) **GENERAL SCIENCE** *Multiple Choice* The unique property of carbon that is important to living organisms is its ability to:

- W) conduct electricity in graphite form.
- X) combine with other elements
- Y) form long chains of carbon atoms
- Z) exist as both diamond and graphite

ANSWER: Y) FORM LONG CHAINS OF CARBON ATOMS

TOSS-UP

18) **MATH** *Short Answer* Convert the decimal fraction 0.055 into its common fraction:

ANSWER: $\frac{55}{1000}$ (ACCEPT: $55/10^3$ and $11/200$)

BONUS

18) **MATH** *Short Answer* Solve the following equation: $-2 + x = 5$

ANSWER: 7

TOSS-UP

19) **PHYSICAL SCIENCE** *Short Answer* When Natalie rides in a circle on her horse she perceives a force which tends to throw her off her horse to the outside of the ring. What is the common name for this fictitious force center fleeing force:

ANSWER: CENTRIFUGAL FORCE

BONUS

19) **PHYSICAL SCIENCE** *Short Answer* If an atom of gold has an atomic number of 79 and an atomic mass of 197, how many protons and neutrons are in the nucleus?

ANSWER: 79 PROTONS, 118 NEUTRONS

TOSS-UP

20) **LIFE SCIENCE** *Multiple Choice* Which of the following is the organ mainly responsible for producing digestive enzymes and insulin:

- W) spleen
- X) liver
- Y) thyroid
- Z) pancreas

ANSWER: Z) PANCREAS

BONUS

20) **LIFE SCIENCE** *Short Answer* Made up of barbs, calami, and shafts these are one of the most distinctive structures of the vertebrate class Aves.

ANSWER: FEATHERS

TOSS-UP

21) **PHYSICAL SCIENCE** *Multiple Choice* Which of the following musical instruments can produce a pure tone:

- W) violin
- X) clarinet
- Y) piano
- Z) electronic synthesizer

ANSWER: Z) ELECTRONIC SYNTHESIZER

BONUS

21) **PHYSICAL SCIENCE** *Short Answer* Which is the lightest metal in the group known in the periodic table as the alkali metals?

ANSWER: LITHIUM (ACCEPT: Li)

TOSS-UP

22) **EARTH SCIENCE** *Short Answer* What is the name given to the tides that occur during the new moon and full moon?

ANSWER: SPRING TIDES

BONUS

22) **EARTH SCIENCE** *Multiple Choice* In limestone formations, the development of caves requires water and which of the following:

- W) oxygen
- X) nitrogen
- Y) carbon monoxide
- Z) carbon dioxide

ANSWER: Z) CARBON DIOXIDE

TOSS-UP

23) MATH *Short Answer* What is the formula for the volume of a sphere of radius R:

ANSWER: $\frac{4}{3} \pi R^3$

BONUS

23) MATH *Short Answer* Which of the following are rational numbers:

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

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

TOSS-UP

24) GENERAL SCIENCE *Short Answer* What is the name for the outermost layer of the sun?

ANSWER: CORONA

BONUS

24) GENERAL SCIENCE *Short Answer* Kevin wishes to look at the stars with his binoculars. He also wants to look at a star chart with a flashlight, but he knows a regular white light will interfere with the sensitivity of his eyes to dim light. What color light is best for his flashlight?

ANSWER: RED

TOSS-UP

25) EARTH SCIENCE *Multiple choice* The typical thunderstorm clouds of summer, sometimes referred to as hammerheads or thunderheads, are called:

- W) cumulonimbus
- X) altocumulus
- Y) stratocumulus
- Z) cirrocumulus

ANSWER: W) CUMULONIMBUS

BONUS

25) EARTH SCIENCE *Multiple Choice* About how far away is the closest star to the Earth?

- W) 83 thousand miles
- X) 19 million miles
- Y) 93 million miles
- Z) 2 light years

ANSWER: Y) 93 MILLION MILES

ROUND ROBIN 7

TOSS-UP

*1) **GENERAL SCIENCE** *Multiple Choice* Which of the following acids is NOT a flavoring used in foods?

- W) acetic acid
- X) lactic acid
- Y) citric acid
- Z) nitric acid

ANSWER: Z) NITRIC ACID

BONUS

1) **GENERAL SCIENCE** *Multiple Choice* Which of the following is used to focus the electron beam in an electron microscope?

- W) condensers
- X) electromagnets
- Y) glass lenses
- Z) gonculators

ANSWER: X) ELECTROMAGNETS

TOSS-UP

2) **MATH** *Short Answer* What is the square root of 0.49?

ANSWER: 0.7

BONUS

2) **MATH** *Short Answer* Simplify the following algebraic expression: $3x^2 + 4 - (3x + 2 - x^2)$

ANSWER: $4x^2 - 3x + 2$

TOSS-UP

3) **LIFE SCIENCE** *Multiple Choice* Which is not a basic muscle type in the human body?

- W) smooth
- X) skeletal
- Y) ventricular
- Z) cardiac

ANSWER: Y) VENTRICULAR

BONUS

3) **LIFE SCIENCE** *Multiple Choice* Stamen is to anther as carpel is to:

- W) sepal
- X) ovary
- Y) egg
- Z) pollen

ANSWER: X) OVARY

TOSS-UP

4) **EARTH SCIENCE** *Multiple Choice* Eighty percent of the magma that results from a volcanic eruption is of what substance?

- W) basalt
- X) rhyolite
- Y) andesite
- Z) silicon dioxide

ANSWER: W) BASALT

BONUS

4) **EARTH SCIENCE** *Multiple Choice* Each day, most coastal beaches encounter:

- W) one high tide and one low tide
- X) two high tides and one low tide
- Y) two high tides and two low tides
- Z) three high tides and three low tides

ANSWER: Y) TWO HIGH TIDES AND TWO LOW TIDES

TOSS-UP

5) **GENERAL SCIENCE** *Multiple Choice* Which of the following is most typically used as a unit of measurement for pressure:

- W) pascal
- X) dyne
- Y) weber
- Z) tesla

ANSWER: W) PASCAL

BONUS

*5) **GENERAL SCIENCE** *Multiple Choice* Which of the following household items is the best example of containing matter in the plasma state?

- W) fluorescent light
- X) toaster oven
- Y) blender
- Z) microwave oven

ANSWER: W) FLUORESCENT LIGHT

TOSS-UP

6) **EARTH SCIENCE** *Multiple Choice* The last two stars in the bowl of the big dipper point to which of the following?

- W) Vega
- X) Cassiopeia
- Y) Scorpio
- Z) Polaris

ANSWER: Z) POLARIS

BONUS

6) **EARTH SCIENCE** *Short Answer* What is an area on earth that does not receive seismic waves during an earthquake called?

ANSWER: SHADOW ZONE

TOSS-UP

*7) **PHYSICAL SCIENCE** *Multiple Choice* Certain products have been designed so that people wearing headphones do not hear the objectionably loud sound from certain machinery with which they are working. These headphones work based on which one of the following principles:

- W) doppler effect
- X) destructive interference
- Y) constructive interference
- Z) audiopolarization

ANSWER: X) DESTRUCTIVE INTERFERENCE

BONUS

*7) **PHYSICAL SCIENCE** *Multiple Choice* In chemical reactions when bonds between atoms are broken which of the following is most correct:

- W) energy is always needed
- X) both heat and light are always emitted
- Y) energy is always released
- Z) they cannot be repaired

ANSWER: W) ENERGY IS ALWAYS NEEDED

TOSS-UP

8) **MATH** *Multiple Choice* If the average speed of a bicyclist is 2 meters/second for one kilometer, then the biker must have traveled the entire distance and:

- W) stayed at 2 meters/second
- X) did not encounter hills
- Y) did not stop
- Z) took 500 seconds

ANSWER: Z) TOOK 500 SECONDS

BONUS

8) **MATH** *Short Answer* Simplify the following algebraic expression: $2x + 3(y + 3z + x)$

ANSWER: $5x + 3y + 9z$

TOSS-UP

9) **PHYSICAL SCIENCE** *Short Answer* If the distance separating two charges is tripled, the force between them decreases by what factor?

ANSWER: 9

BONUS

*9) **PHYSICAL SCIENCE** *Multiple Choice* The reason why a beach ball held under the surface will pop up when released is because:

- W) the buoyant force has a net upward direction
- X) gravity is only acting at the surface
- Y) the pressure of the water is only in the upward direction
- Z) the ball is lighter than air

ANSWER: W) THE BUOYANT FORCE HAS A NET UPWARD DIRECTION

TOSS-UP

10) **MATH** *Short Answer* Reduce $\frac{18}{54}$ to its lowest fraction:

ANSWER: $\frac{1}{3}$

BONUS

10) **MATH** *Short Answer* Find the value of $4x - 6y$ if $x = -2$ and $y = -3$:

ANSWER: 10

TOSS-UP

11) **LIFE SCIENCE** *Multiple Choice* The receptors in the retina of the eye that detect faint light and transfer non-color impulses to the brain are:

- W) corpuscles
- X) rods
- Y) cones
- Z) axons

ANSWER: X) RODS

BONUS

11) **LIFE SCIENCE** *Multiple Choice* Which of the following does NOT occur in mitosis:

- W) DNA synthesis
- X) sets of sister chromatids line up singly
- Y) sister chromatids separate as the centromere divides
- Z) spindle fibers help in the movement of chromosomes

ANSWER: W) DNA SYNTHESIS

TOSS-UP

10) **PHYSICAL SCIENCE** *Multiple Choice* Which of the following is the emission source for microwaves in a typical microwave oven:

- W) small cyclotron
- X) cadmium disk bombarded with a soft x-ray source
- Y) magnetron
- Z) laser lamp

ANSWER: Y) MAGNETRON

BONUS

*10) **PHYSICAL SCIENCE** *Multiple Choice* The red color in firework displays on the Fourth of July is caused by which element?

- W) lithium
- X) sodium
- Y) copper
- Z) iron

ANSWER: W) LITHIUM

TOSS-UP

13) **EARTH SCIENCE** *Multiple Choice* Which of the following is a calcite-rich carbonate rock:

- W) limestone
- X) dolostone
- Y) shale
- Z) sandstone

ANSWER: W) LIMESTONE

BONUS

13) **EARTH SCIENCE** *Short Answer* What is the hot, putty like layer of Earth's mantle located from about 75 to 300 kilometers below the surface, where rocks have little strength?

ANSWER: ASTHENOSPHERE

TOSS-UP

14) **LIFE SCIENCE** *Multiple Choice* Which of the following is an example of a multiple fruit?

- W) pear
- X) grape
- Y) pineapple
- Z) orange

ANSWER: Y) PINEAPPLE

BONUS

14) **LIFE SCIENCE** *Short Answer* Binomial nomenclature is classically made up of what two taxonomical terms?

ANSWER: GENUS and SPECIES

TOSS-UP

15) EARTH SCIENCE *Short Answer* What is the name of a mixture of molten rock, suspended mineral grains, and dissolved gases that forms within the crust or mantle of the Earth when temperatures are sufficiently high?

ANSWER: MAGMA (DO NOT ACCEPT: LAVA)
(Solution: magma becomes lava when it erupts at the surface)

BONUS

15) EARTH SCIENCE *Multiple Choice* A famous downslope wind that occurs in North America on the East side of the Rocky Mountains is called a:

- W) sirocco
- X) mistral
- Y) foehn
- Z) chinook

ANSWER: Z) CHINOOK

TOSS-UP

16) LIFE SCIENCE *Multiple Choice* Spallanzani, Reti and Pasteur were all:

- W) helpful in disproving the theory of spontaneous generation
- X) great Italian chefs
- Y) scientists who supported the genetic work of Mendel
- Z) supporters of the work of Charles Darwin

ANSWER: W) HELPFUL IN DISPROVING THE THEORY OF SPONTANEOUS GENERATION

BONUS

16) LIFE SCIENCE *Short Answer* What organ of the human body is primarily responsible for removing abnormal red blood cells from the circulation ?

ANSWER: SPLEEN

TOSS-UP

17) **GENERAL SCIENCE** *Multiple Choice* Which of the following is a gas which presents a serious risk for cancer to thousands of Americans?

- W) Chlorine
- X) Argon
- Y) Neon
- Z) Radon

ANSWER: Z) RADON

BONUS

17) **GENERAL SCIENCE** *Short Answer* What fibrous protein found in nature is well known by scientists to be stronger by weight than steel?

ANSWER: SILK

TOSS-UP

18) **GENERAL SCIENCE** *Multiple Choice* Which of the following is the boiling point of water in the Kelvin temperature scale:

- W) 212.13
- X) 262.17
- Y) 373.18
- Z) 459.72

ANSWER: Y) 373.18

BONUS

18) **GENERAL SCIENCE** *Multiple Choice* If you want to specify the position of an object you must use:

- W) a reference point
- X) its mass
- Y) metric units
- Z) a meter tape

ANSWER: W) A REFERENCE POINT

TOSS-UP

19) **EARTH SCIENCE** *Multiple Choice* A rising barometer and clear skies indicate an approaching:

- W) warm front
- X) high-pressure area
- Y) low-pressure area
- Z) cold front

ANSWER: X) HIGH-PRESSURE AREA

BONUS

19) **EARTH SCIENCE** *Multiple choice* You find a mineral in the local rock shop. You know it is composed of carbonate, that it has perfect rhombohedral cleavage, and when you look through at the text on a nearby newspaper, you find it exhibits the property of double refraction. This mineral would most likely be which of the following:

- W) mica
- X) calcite
- Y) basalt
- Z) halite

ANSWER: X) CALCITE

TOSS-UP

20) **MATH** *Short Answer* What is the least common denominator for the following operation:

$$\frac{1}{2} + \frac{2}{3} + \frac{4}{5}$$

ANSWER: 30

BONUS

20) **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

21) **PHYSICAL SCIENCE** *Short Answer* Where is the gravitational force the greatest for a uniform spherical planet:

ANSWER: AT ITS SURFACE

BONUS

*21) **PHYSICAL SCIENCE** *Multiple Choice* Which best explains the idea of conservation of matter in chemical reactions:

- W) atoms are neither created or destroyed
- X) the number of reactant molecules must equal the number of product molecules
- Y) energy and matter are equivalent
- Z) bond are either formed and/or broken

ANSWER: W) ATOMS ARE NEITHER CREATED OR DESTROYED

TOSS-UP

22) **GENERAL SCIENCE** *Multiple Choice* In a mercury barometer, which of the following is the typically reported height of the column of mercury that is required to balance against the pressure of 1 atmosphere?

- W) 760 millimeters
- X) 14 pounds per square inch
- Y) 1 meter
- Z) 32 inches

ANSWER: W) 760 MILLIMETERS

BONUS

*22) **GENERAL SCIENCE** *Multiple Choice* For a given compound, motion at the molecular level is:

- W) greatest for gases
- X) greatest for solid
- Y) least for liquids
- Z) least for gases

ANSWER: W) GREATEST FOR GASES

TOSS-UP

23) **PHYSICAL SCIENCE** *Short Answer* What is the following statement most commonly known as: “A body immersed in a fluid is supported by a force equal to the weight of the fluid it displaces.”

ANSWER: ARCHIMEDES’ PRINCIPLE

BONUS

*23) **PHYSICAL SCIENCE** *Multiple Choice* Boats made of iron and steel will float because:

- W) iron and steel are less dense than water
- X) the water displaced by the boat weighs more than the boat
- Y) surface tension holds the boat up
- Z) iron and steel are more dense than water

ANSWER: X) THE WATER DISPLACED BY THE BOAT WEIGHS MORE THAN THE BOAT

TOSS-UP

24) **LIFE SCIENCE** *Short Answer* A potato is a swollen underground stem that stores food for the plant. What is the scientific term for the swollen area?

ANSWER: TUBER

BONUS

24) **LIFE SCIENCE** *Short Answer* Give the common colloquial names in respective order for the following 3 anatomical structures: patella, scapula, hallux

ANSWER: KNEE CAP, SHOULDER BLADE, BIG TOE

TOSS-UP

25) **MATH** *Short Answer* What is the length of the hypotenuse of a right triangle whose other two sides are 6 and 8 units long?

ANSWER: 10

BONUS

25) **MATH** *Short Answer* If you were to invest \$1000 in a savings account that pays 5% simple annual interest, how much interest in dollars will you earn in 1 year?

ANSWER: \$50

SINGLE ELIMINATION ROUND 1

TOSS-UP

1) **MATH** *Multiple Choice* For numbers ≤ 10 (read as: less than or equal to 10), and not including the number 1, how many are prime numbers?

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

ANSWER: X) 4 (Solution: primes are 2, 3, 5, 7)

BONUS

1) **MATH** *Short Answer* Factor the expression: $x^2 + 3x - 10$

ANSWER: $(x + 5)(x - 2)$

TOSS-UP

2) **LIFE SCIENCE** *Multiple Choice* A summary reaction for photosynthesis is:

- W) $\text{CO}_2 + \text{O}_2 + \text{H}_2\text{O}$ and light yields carbohydrate + O_2
- X) $\text{CO}_2 + \text{H}_2\text{O}$ and light yields carbohydrate + O_2
- Y) $\text{CO}_2 + \text{H}_2\text{O}$ and light yields carbohydrate + H_2O
- Z) $\text{CO}_2 + \text{O}_2 + \text{H}_2\text{O}$ and light yields carbohydrate + H_2O

ANSWER: X) $\text{CO}_2 + \text{H}_2\text{O}$ AND LIGHT YIELDS CARBOHYDRATE + O_2

BONUS

2) **LIFE SCIENCE** *Multiple Choice* It is generally believed that most of the oxygen in the air today came from:

- W) oxidation of carbon molecules containing oxygen
- X) release of oxygen from volcanic vents
- Y) photosynthesis
- Z) forest fires

ANSWER: Y) PHOTOSYNTHESIS

TOSS-UP

3) **LIFE SCIENCE** *Multiple Choice* Osmosis is:

- W) the movement of water through a permeable membrane
- X) the movement of salts through a semi-permeable membrane
- Y) the movement of water through a semi-permeable membrane
- Z) the pressure exerted by water through a semi-permeable membrane

ANSWER: Y) THE MOVEMENT OF WATER THROUGH A SEMI-PERMEABLE MEMBRANE

BONUS

3) **LIFE SCIENCE** *Multiple Choice* Which of the following is most accurate about the pasteurization of milk:

- W) it makes milk taste better
- X) it kills all bacteria by sterilizing the milk
- Y) it lowers the milk's pH
- Z) it reduces the population of bacteria by heating but not boiling the milk

ANSWER: Z) IT REDUCES THE POPULATION OF BACTERIA BY HEATING BUT NOT BOILING THE MILK

TOSS-UP

4) **EARTH SCIENCE** *Multiple Choice* The hard rock under the topsoil in eastern Washington state was laid down over millions of years by volcanic eruptions. This rock is:

- W) limestone
- X) basalt
- Y) lava
- Z) granite

ANSWER: X) BASALT

BONUS

4) **EARTH SCIENCE** *Short Answer* Wind speed is measured by what instrument?

ANSWER: ANEMOMETER

TOSS-UP

5) **GENERAL SCIENCE** *Multiple Choice* Doubling a musical note's amplitude:

- W) doubles its frequency
- X) doubles its wavelength
- Y) increases its loudness
- Z) doubles its speed

ANSWER: Y) INCREASES ITS LOUDNESS

BONUS

5) **GENERAL SCIENCE** *Short Answer* Physicists believe there are four fundamental forces of nature. Name any two of them.

ANSWER: GRAVITATIONAL, ELECTROMAGNETIC, STRONG, WEAK (ANY OF THESE FOUR IN ANY ORDER)

TOSS-UP

6) **PHYSICAL SCIENCE** *Short Answer* Spanky swings a ball on the end of a string and maintains it in uniform circular motion, what is the most accurate term for the force exerted on the rock through the string?

ANSWER: CENTRIPETAL

BONUS

6) **PHYSICAL SCIENCE** *Multiple Choice* The density of an object is a property that depends on:

- W) the total weight of object
- X) the total volume of the object
- Y) the liquid the object is suspended in
- Z) none of the above

ANSWER: Z) NONE OF THE ABOVE

TOSS-UP

*7) **PHYSICAL SCIENCE** *Multiple Choice* Amplitude modulation is typically associated with what common form of communication:

- W) television transmission
- X) radio transmission
- Y) short wave transmissions
- Z) laser transmissions

ANSWER: X) RADIO TRANSMISSION

BONUS

7) **PHYSICAL SCIENCE** *Multiple Choice* Which of the following elements does not occur naturally in nature:

- W) uranium
- X) technetium (PRONOUNCED: TECH-net-ee-um)
- Y) boron
- Z) radon

ANSWER: X) TECHNETIUM

TOSS-UP

8) **MATH** *Multiple Choice* Which of the following is NOT true:

- W) all natural numbers are whole numbers
- X) all whole numbers are integers
- Y) all integers are rational numbers
- Z) all numbers can be both a rational number and an irrational number

ANSWER: Z) ALL NUMBERS CAN BE BOTH A RATIONAL NUMBER AND AN IRRATIONAL NUMBER

BONUS

8) **MATH** *Short Answer* Factor the following equation: $x^2 - 6x + 5 = 0$

ANSWER: $(x - 5)(x - 1) = 0$

TOSS-UP

9) **EARTH SCIENCE** *Multiple Choice* As more fossil fuels are burned to produce energy, the greenhouse effect will continue to cause the temperature of the earth's atmosphere to increase. The substance primarily responsible for the greenhouse effect is:

- W) ozone
- X) carbon dioxide
- Y) fluorocarbons
- Z) oxygen

ANSWER: X) CARBON DIOXIDE

BONUS

9) **EARTH SCIENCE** *Multiple Choice* Which of the following is sometimes called volcanic glass because of its shiny appearance:

- W) obsidian
- X) granite
- Y) quartz
- Z) diorite

ANSWER: W) OBSIDIAN

TOSS-UP

10) **GENERAL SCIENCE** *Multiple Choice* Which of the following is the most common cause of deaths in American women between the ages of 20 and 40?

- W) AIDS
- X) breast cancer
- Y) colon cancer
- Z) heart attacks

ANSWER: X) BREAST CANCER

BONUS

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

ANSWER: FOOT, ROD, KILOMETER, MILE

TOSS-UP

11) **PHYSICAL SCIENCE** *Short Answer* For two objects separated by a distance d , if the mass of one of the objects increases by two times, by what factor will the gravitational attraction between them increase?

ANSWER: TWO (ACCEPT 2 TIMES)

BONUS

11) **PHYSICAL SCIENCE** *Multiple Choice* Which of the following elements is found in Period 2 and Group 4A of the Periodic Table:

- W) sulfur
- X) carbon
- Y) nitrogen
- Z) oxygen

ANSWER: X) CARBON

TOSS-UP

12) **GENERAL SCIENCE** *Multiple Choice* Tomorrow's weather forecast report for Venus would be:

- W) snow
- X) cold & clear
- Y) hot & humid with clear skies
- Z) overcast & hot

ANSWER: Z) OVERCAST & HOT

BONUS

10) **GENERAL SCIENCE** *Multiple Choice* What part of the cotton plant produces what is used to make cotton fabric.

- W) flowers or seed pods
- X) fibers in the stems
- Y) root hairs
- Z) fibers in the leaves

ANSWER: W) FLOWERS OR SEED PODS

(Solution: The flowers of the cotton plant develop into seed pods and the seeds inside the pods are surrounded with an abundance of fine white hairs which are used to produce long strands or filaments of cotton thread.)

TOSS-UP

13) **MATH** *Short Answer* In standard form, give the product of $(a + b)^2$:

ANSWER: $a^2 + 2ab + b^2$

BONUS

13) **MATH** *Short Answer* Solve the following equation: $2x + 4 = 6 + 2x$

ANSWER: NO SOLUTION (ACCEPT: FALSE, CONTRADICTION, DEFECTIVE EQUATION, ETC.)

TOSS-UP

14) **LIFE SCIENCE** *Multiple Choice* In bean and corn seeds, the food supply that is used by the seed to germinate and grow is in the:

- W) cotyledon (PRONOUNCED: KOT-ill-ee-don)
- X) root tip
- Y) abscission zone
- Z) petiole

ANSWER: W) COTYLEDON

BONUS

14) **LIFE SCIENCE** *Multiple Choice* Which of the following infectious diseases cannot be cured with current antibiotics:

- W) strep throat
- X) toxic shock syndrome
- Y) scarlet fever
- Z) influenza

ANSWER: Z) INFLUENZA

TOSS-UP

15) **LIFE SCIENCE** *Multiple Choice* The green pigment in plants that captures the energy of sunlight and initiates photosynthesis is called:

- W) chlorophyll
- X) anthocyanin
- Y) carotene
- Z) xanthophylls

ANSWER: W) CHLOROPHYLL

BONUS

15) **LIFE SCIENCE** *Multiple Choice* Which of the following is an ectoparasite:

- W) tape worm
- X) malaria
- Y) pinworm
- Z) lice

ANSWER: Z) LICE

TOSS-UP

16) **EARTH SCIENCE** *Short Answer* What is the name for the fossilized sap of ancient conifer trees that has become brittle and hard, transparent, and yellow to brown in color:

ANSWER: AMBER

BONUS

16) **EARTH SCIENCE** *Multiple Choice* Which of the following minerals constitute approximately 60% of the Earth's crust:

- W) feldspar
- X) quartz
- Y) calcite
- Z) dolomite

ANSWER: W) FELDSPAR

TOSS-UP

17) **GENERAL SCIENCE** *Multiple Choice* In humans, fertilization of the egg occurs most typically in which of the following?

- W) ovary
- X) vagina
- Y) uterus
- Z) fallopian tube

ANSWER: Z) FALLOPIAN TUBE

BONUS

17) **GENERAL SCIENCE** *Multiple Choice* Which of the following is closest to the length of a U.S. five dollar bill?

- W) 6 cm
- X) 12 cm
- Y) 16 cm
- Z) 22 cm

ANSWER: Y) 16 CM

TOSS-UP

18) **GENERAL SCIENCE** *Short Answer* In a typical four cycle gasoline car engine, what are the most common names for the third stage or cycle of the engine if the first cycle is the intake?

ANSWER: IGNITION (ACCEPT: POWER)

BONUS

18) **GENERAL SCIENCE** *Short Answer* Order the following from the least used energy source to produce electricity in the U.S.A. to the most: hydroelectricity, oil, coal, nuclear

ANSWER: HYDROELECTRICITY, OIL, NUCLEAR, COAL

TOSS-UP

*19) **PHYSICAL SCIENCE** *Multiple Choice* A manual laborer moves 40 kilograms of flour 5 feet above the ground in 5 seconds. If she does the same task in twice the time it involves a different amount of what:

- W) power
- X) work
- Y) kinetic energy
- Z) potential energy

ANSWER: W) POWER

BONUS

19) **PHYSICAL SCIENCE** *Short Answer* What is the chemical symbol for the toxic element that causes mental retardation and is medically referred to as Plumbism?

ANSWER: Pb

TOSS-UP

20) **EARTH SCIENCE** *Multiple Choice* Which of the following is primarily involved in the movement of a glacier:

- W) running water
- X) ambient temperature
- Y) topology
- Z) gravity

ANSWER: Z) GRAVITY

BONUS

20) **EARTH SCIENCE** *Multiple choice* The Saffir-Simpson Scale is used to classify intensities of:

- W) hurricanes
- X) tornadoes
- Y) earthquakes
- Z) volcanic eruptions

ANSWER: W) HURRICANES

TOSS-UP

21) **MATH** *Multiple Choice* The equation, $x = -4$, is which of the following:

- W) a true statement
- X) a false statement
- Y) a conditional equation
- Z) an equivalent equation

ANSWER: Y) A CONDITIONAL EQUATION

BONUS

21) **MATH** *Short Answer* Express the square root of 75 in its simplest radical form:

ANSWER: $5\sqrt{3}$

TOSS-UP

22) **PHYSICAL SCIENCE** *Short Answer* This person established the “one fluid theory” of electricity and performed some of the first investigations into electrical grounding and insulation:

ANSWER: BEN FRANKLIN

BONUS

*22) **PHYSICAL SCIENCE** *Multiple Choice* What is always unchanged in any chemical reaction as reactants form products:

- W) the number of molecules
- X) the kind and number of atoms
- Y) the temperature
- Z) the pressure

ANSWER: X) THE KIND AND NUMBER OF ATOMS

TOSS-UP

23) **EARTH SCIENCE** *Multiple Choice* A continental glacier is found in which of the following locations:

- W) The Swiss Alps
- X) The Canadian Rockies
- Y) Greenland
- Z) The Andes Mountains

ANSWER: Y) GREENLAND

BONUS

23) **EARTH SCIENCE** *Short Answer* The ability of mica to split into flat planar flakes resembling the leaves of a book is called what?

ANSWER: CLEAVAGE

TOSS-UP

24) **MATH** *Short Answer* What is the square root of $\frac{1}{4}$?

ANSWER: $\frac{1}{2}$

BONUS

24) **MATH** *Short Answer* Simplify the following algebraic expression: $4x - 3(a - b)$

ANSWER: $4x - 3a + 3b$

TOSS-UP

25) LIFE SCIENCE *Multiple Choice* Which of the following is the hormone produced by the human body to control blood sugar and when not produced in sufficient amounts is the cause of some forms of diabetes:

- W) hemoglobin
- X) pituitary hormone
- Y) insulin
- Z) testosterone

ANSWER: Y) INSULIN

BONUS

25) LIFE SCIENCE *Multiple Choice* The wing of a bird and the arm of a human are considered:

- W) congruent structures
- X) analogous structures
- Y) homologous structures
- Z) vestigial structures

ANSWER: Y) HOMOLOGOUS STRUCTURES

SINGLE ELIMINATION ROUND 2

TOSS-UP

1) **PHYSICAL SCIENCE** *Multiple Choice* Which of the following components corresponds to the pitch of a sound wave:

- W) wavelength
- X) frequency
- Y) amplitude
- Z) speed

ANSWER: X) FREQUENCY

BONUS

1) **PHYSICAL SCIENCE** *Multiple Choice* In a closed container, if a gas is heated, which of the following occurs:

- W) molecular motion will decrease
- X) the gas will condense on the inner walls of the container
- Y) the chemical properties will change
- Z) the pressure will increase

ANSWER: Z) THE PRESSURE WILL INCREASE

TOSS-UP

*2) **LIFE SCIENCE** *Multiple Choice* Which of the following is NOT true:

- W) all the DNA in a eukaryotic cell is contained in the nucleus
- X) chiasma are a method of genetic interchromosomal exchange
- Y) in deuterostomes, the blastopore forms the anus
- Z) in lower plants the sporophyte is parasitic upon the gametophyte

ANSWER: W) ALL THE DNA IN A EUKARYOTIC CELL IS CONTAINED IN THE NUCLEUS

BONUS

2) **LIFE SCIENCE** *Short Answer* What is the name of the layer of cells that are produced by the phellogen and, as they mature and die, their cell walls are encrusted with suberin?

ANSWER: CORK

TOSS-UP

3) **LIFE SCIENCE** *Multiple Choice* Which of the following is the correct botanical term for the stem of a flower:

- W) peduncle (pronounced: pea-done-kle)
- X) stolon
- Y) rhizome
- Z) tuber

ANSWER: W) PEDUNCLE

BONUS

*3) **LIFE SCIENCE** *Multiple Choice* When reading the level of a fluid in a graduated cylinder, what part of the meniscus is lined up with the graduations to give an accurate reading of the volume?

- W) the top of the meniscus
- X) the bottom of the meniscus
- Y) the middle of the meniscus
- Z) the side of the meniscus

ANSWER: X) THE BOTTOM OF THE MENISCUS

TOSS-UP

4) **EARTH SCIENCE** *Multiple Choice* The Arctic Circle lies at which of the following latitudes:

- W) $66\frac{1}{2}^{\circ}$ North
- X) 90° North
- Y) $66\frac{1}{2}^{\circ}$ South
- Z) 90° South

ANSWER: W) $66\frac{1}{2}^{\circ}$ NORTH

BONUS

4) **EARTH SCIENCE** *Short Answer* What is the only common mineral to be strongly magnetic other than magnetite:

ANSWER: PYRRHOTITE (ACCEPT: FeS OR IRON SULFIDE)

TOSS-UP

5) **MATH** *Multiple Choice* A graph of a stationary object graphed with position on the vertical axis and time on the horizontal axis is:

- W) a horizontal line
- X) a vertical line
- Y) a curved line
- Z) a line at 45 degrees

ANSWER: W) A HORIZONTAL LINE

BONUS

5) **MATH** *Short Answer* Combine the terms in the following expression: $5 + 3x - 2y - 10$

ANSWER: $3x - 2y - 5$ (ACCEPT: $-5 + 3x - 2y$)

TOSS-UP

*6) **GENERAL SCIENCE** *Multiple Choice* Which of the following would typically be the most accurate for measuring exactly 1 liter of water:

- W) a pyrex 1 liter graduated cylinder
- X) a pyrex 1 liter beaker
- Y) a pyrex 2 liter beaker
- Z) a pyrex 1 liter Erlenmyer flask

ANSWER: W) a pyrex 1 liter graduated cylinder

BONUS

*6) **GENERAL SCIENCE** *Multiple Choice* Pavlov is noted to have developed what is called classical conditioning. Which of the following is the best example of this?

- W) a dog hears its owner opening a can of food and the dog salivates
- X) a young boy looks forward to getting his allowance
- Y) a bird flies south when winter approaches
- Z) a monkey is trained to play ping pong through a series of rewards and punishments

ANSWER: W) A DOG HEARS ITS OWNER OPENING A CAN OF FOOD AND THE DOG SALIVATES

TOSS-UP

*7) **GENERAL SCIENCE** *Multiple Choice* Which of the following is the most effective means of preventing the spread of infections in hospitals?

- W) antibiotic treatment
- X) proper sterilization of all materials
- Y) washing hands frequently
- Z) wearing surgical masks

ANSWER: Y) WASHING HANDS FREQUENTLY

BONUS

*7) **GENERAL SCIENCE** *Multiple Choice* Which of the following best describes what most experts believe about *Homo sapiens*?

- W) they arose out of Africa less than 200,000 years ago
- X) they arose from Neanderthals about 1 million years ago
- Y) they arose from apes about 20 million years ago
- Z) they arose from China about 2 million years ago

ANSWER: W) THEY AROSE OUT OF AFRICA LESS THAN 200,000 YEARS AGO

TOSS-UP

8) **EARTH SCIENCE** *Multiple Choice* An increase in chlorine in the stratosphere is believed to be the cause of which of the following:

- W) the Antarctic ozone hole
- X) increased photolysis of oxygen
- Y) decreased photolysis of oxygen
- Z) loss of atmospheric nitrogen

ANSWER: W) THE ANTARCTIC OZONE HOLE

BONUS

8) **EARTH SCIENCE** *Short Answer* Order the following minerals from the hardest to the softest: Calcite; Talc; Quartz; Diamond

ANSWER: DIAMOND; QUARTZ; CALCITE; TALC

TOSS-UP

9) **PHYSICAL SCIENCE** *Multiple Choice* At which temperature would water most likely boil on Mount McKinley:

- W) 90°C
- X) 100°C
- Y) 110°C
- Z) 120°C

ANSWER: W) 90°C

BONUS

9) **PHYSICAL SCIENCE** *Multiple Choice* If one holds a piece of notebook paper vertically in front of and below the mouth and blows strongly over the paper, the paper rises in the direction that the air is flowing. This illustrates what principle of physics:

- W) Archimedes' Principle
- X) Bernoulli's Law
- Y) Pascal's Law
- Z) Charles' Law

ANSWER: X) BERNOULLI'S LAW

TOSS-UP

10) **MATH** *Short Answer* In the following set of numbers, which is NOT a prime number:
3, 5, 11, 17, 25, 29

ANSWER: 25

BONUS

10) **MATH** *Short Answer* A farmer wants to make a square fenced-in area for his cows, with an area of 1600 square feet. He wants to have a fence post every 10 feet on the perimeter. How many fence posts will he need?

ANSWER: 12

(Solution: square is 40 feet on a side; 3 posts per side (don't count corners twice))

TOSS-UP

11) **PHYSICAL SCIENCE** *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

11) **PHYSICAL SCIENCE** *Multiple Choice* Molecules that have the same chemical formula but have different shapes or geometric arrangements are called:

- W) isomers
- X) twins
- Y) gluons
- Z) isotopes

ANSWER: W) ISOMERS

TOSS-UP

*12) **EARTH SCIENCE** *Multiple Choice* Which of the following is NOT true regarding the far side of the moon:

- W) it contains no large maria
- X) it contains numerous craters and highlands
- Y) it has been surveyed by spacecraft
- Z) it is always dark

ANSWER: Z) IT IS ALWAYS DARK

BONUS

12) **EARTH SCIENCE** *Multiple Choice* The Fujita Scale is used to classify intensities of:

- W) hurricanes
- X) tornadoes
- Y) earthquakes
- Z) volcanic eruptions

ANSWER: X) TORNADOES

TOSS-UP

13) **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

13) **MATH** *Short Answer* If you begin with 1 and double it 12 times, what will the total be?

ANSWER: 4,096

TOSS-UP

14) **EARTH SCIENCE** *Multiple Choice* Most of the rain that reaches the ground is from which of the following clouds?

- W) cumulus
- X) cirrus
- Y) nimbus
- Z) lenticular

ANSWER: Y) NIMBUS

BONUS

14) **EARTH SCIENCE** *Multiple Choice* A tropical storm will be declared a hurricane when:

- W) it moves out of the tropics
- X) wind speeds reach 34 mph
- Y) tornadoes are observed
- Z) there is evidence of eye formation and sustained wind speeds of 74 mph

ANSWER: Z) THERE IS EVIDENCE OF EYE FORMATION AND SUSTAINED WIND SPEEDS OF 74 MPH

TOSS-UP

15) **LIFE SCIENCE** *Multiple Choice* Which of the following is the most specific place where the subunits of ribosomes are made in eukaryotes?

- W) nucleus
- X) endoplasmic reticulum
- Y) mitochondria
- Z) nucleolus

ANSWER: Z) NUCLEOLUS

BONUS

*15) **LIFE SCIENCE** *Multiple Choice* Which of the following is NOT characteristic of mitosis:

- W) chromosomes line up on an equatorial plate
- X) occurs in somatic cells
- Y) crossing over
- Z) preceded by the disappearance of the nuclear membrane

ANSWER: Y) CROSSING OVER

TOSS-UP

*16) **GENERAL SCIENCE** *Short Answer* What substance, because of its ability to dissolve so many different things, is usually considered the “universal solvent”?:

ANSWER: Water

BONUS

*16) **GENERAL SCIENCE** *Multiple Choice* In typical U.S. household wiring, which of the following colored wires is properly matched to its description?

- W) white for “hot”
- X) black for neutral
- Y) white for ground
- Z) green for ground

ANSWER: Z) GREEN FOR GROUND

TOSS-UP

*17) **EARTH SCIENCE** *Multiple Choice* Which of the following occurs during a lunar eclipse?

- W) the moon passes between the Earth and the Sun
- X) the Earth passes between the Sun and the Moon
- Y) the Sun passes between the Earth and the Moon
- Z) Solar flares increase in intensity

ANSWER: X) THE EARTH PASSES BETWEEN THE SUN AND THE MOON

BONUS

17) **EARTH SCIENCE** *Short Answer* Magnetite is composed of what two elements?

ANSWER: IRON AND OXYGEN

TOSS-UP

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

ANSWER: ELECTROMAGNET

BONUS

18) **PHYSICAL SCIENCE** *Short Answer* In pursuit of an insect, a lizard, braced against a rock, accelerates with a horizontal magnitude of 15 meters per second squared. How much horizontal force, in newtons, must the lizard exert on the rock to produce this acceleration if the lizard has a mass of 3 kilograms?

ANSWER: 45 NEWTONS (ACCEPT: 45)

(Solution: $F=MA$; $F=3 \times 15$; $F=45$)

TOSS-UP

19) **MATH** *Multiple Choice* The equation $y(5+2y) = y \times 5 + y \times 2y$ (read as: y times, parentheses, five plus two y, close parentheses, equals y times five plus y times two y) is an example of which algebraic property:

- W) commutative property of addition
- X) associative property of addition
- Y) distributive property
- Z) additive identity property

ANSWER: Y) DISTRIBUTIVE PROPERTY

BONUS

19) **MATH** *Short Answer* Combine the terms in the following expression: $12xy - 4x + 6y - 20yx$

ANSWER: $-10xy - 4x + 6y$ (ACCEPT: $-4x + 6y - 10xy$)

TOSS-UP

*20) **GENERAL SCIENCE** *Multiple Choice* Barney and Fred are looking at a star chart listing the brightness of stars to observers on Earth. Which of the following heavenly bodies would most likely match with a magnitude value of negative 13?

- W) the Moon
- X) the Sun
- Y) Jupiter
- Z) Pluto

ANSWER: W) THE MOON

BONUS

20) **GENERAL SCIENCE** *Short Answer* Which two of the following 5 elements are named after famous female scientists? Berkelium, Lawrencium, Meitnerium, Curium, Osmium

ANSWER: MEITNERIUM, CURIUM

TOSS-UP

*21) **GENERAL SCIENCE** *Multiple Choice* Where will you most likely absorb the most ionizing radiation?

- W) in a space shuttle 30 miles above the earth
- X) working in an assembly line packing nuclear reactor fuel rods with uranium pellets
- Y) working in a coal mine
- Z) working in a control room at a nuclear power plant

ANSWER: W) IN A SPACE SHUTTLE 30 MILES ABOVE THE EARTH

BONUS

21) **GENERAL SCIENCE** *Short Answer* Rounded to the nearest hundred, what is the temperature in Fahrenheit of a substance at 1000°C ?

ANSWER: 1800

TOSS-UP

22) **LIFE SCIENCE** *Multiple Choice* The presence of which of the following is what makes rough endoplasmic reticulum appear rough and not smooth?

- W) ribosomes
- X) globular proteins
- Y) glycolipids
- Z) growing proteins

ANSWER: W) RIBOSOMES

BONUS

22) **LIFE SCIENCE** *Short Answer* A lack of the neurotransmitter dopamine in the brain of humans causes what disease that afflicts thousands of US people including Michael J. Fox and Janet Reno:

ANSWER: PARKINSON'S

TOSS-UP

23) **MATH** *Short Answer* The price of a postage stamp changes from 33 cents to 34 cents. What is the percent increase in price?

ANSWER: 3 (ACCEPT: 3.03)

BONUS

23) **MATH** *Short Answer* Simplify the following equation: $\frac{7x^2}{x^3}$

ANSWER: $\frac{7}{x}$ (ACCEPT: $7(x)^{-1}$)

TOSS-UP

24) **LIFE SCIENCE** *Multiple Choice* Which of the following is NOT a protist?

- W) Paramecium
- X) Euglena
- Y) Amoeba
- Z) Anabaena (AN-ah-BEEN-ah)

ANSWER: Z) ANABAENA

BONUS

24) **LIFE SCIENCE** *Short Answer* Give the respective common name for the following tissues: hepatic, cardiac, epidermis.

ANSWER: LIVER, HEART, SKIN

TOSS-UP

25) **PHYSICAL SCIENCE** *Short Answer* The ability of a semiconductor to carry a current is increased by a process called:

ANSWER: DOPING

BONUS

25) **PHYSICAL SCIENCE** *Short Answer* Order the following from the LOWEST to the HIGHEST temperature: water boils, iron melts, ammonia boils, tin melts

ANSWER: AMMONIA BOILS, WATER BOILS, TIN MELTS, IRON MELTS

SINGLE ELIMINATION ROUND 3

TOSS-UP

*1) **GENERAL SCIENCE** *Multiple Choice* Fungi are usually spread most effectively by:

- W) water born hyphae
- X) airborne spores
- Y) animal ingestion of spores
- Z) soil germination of seeds

ANSWER: X) AIRBORNE SPORES

BONUS

*1) **GENERAL SCIENCE** *Multiple Choice* When using a compound light microscope, which of the following is the proper procedure for focusing?

- W) begin with a low power objective and use only course focus when using the high power objective
- X) begin with a high power objective and use only fine focus when using the low power objective
- Y) begin with a low power objective and use only fine focus when using the high power objective
- Z) begin with a high power objective and use only course focus when using the low power objective

ANSWER: Y) BEGIN WITH A LOW POWER OBJECTIVE AND USE ONLY FINE FOCUS WHEN USING THE HIGH POWER OBJECTIVE

TOSS-UP

2) **MATH** *Short Answer* Factor the following quadratic equation: $x^2 + 6x + 9$

ANSWER: $(x + 3)(x + 3)$ or $(x + 3)^2$

BONUS

2) **MATH** *Short Answer* If you count from 1 to 100, how many 9's will you pass on the way?

ANSWER: 20

TOSS-UP

3) **MATH** *Multiple Choice* Which of the following is a binomial?

W) $\frac{x^2}{2}$

X) $x^2 + 5x - 2$

Y) π

Z) $x - 2$

ANSWER : Z) $x - 2$

BONUS

3) **MATH** *Short Answer* What are all the integral factors of the number 22?

ANSWER: 1, 2, 11, 22 (ACCEPT: + or - 1, 2, 11, 22)

TOSS-UP

4) **LIFE SCIENCE** *Multiple Choice* During photosynthesis, for every molecule of glucose that is made, how many molecules of carbon dioxide and water are consumed?

W) six carbon dioxide molecules and six water molecules

X) four carbon dioxide molecules and four water molecules

Y) twelve carbon dioxide molecules and twelve water molecules

Z) six carbon dioxide molecules and twelve water molecules

ANSWER: W) SIX CARBON DIOXIDE MOLECULES AND SIX WATER MOLECULES

BONUS

4) **LIFE SCIENCE** *Multiple Choice* Which of the following best describes antibodies:

W) a class of polysaccharides involved in the immune system

X) a group of proteins made by plasma cells in response to a foreign substance

Y) small bodies of insects that look like ants

Z) a class of genes produced by the immune system to fight disease

ANSWER: X) A GROUP OF PROTEINS MADE BY PLASMA CELLS IN RESPONSE TO A FOREIGN SUBSTANCE

TOSS-UP

5) **EARTH SCIENCE** *Multiple choice* If wind speeds in a storm are clocked in excess of 200 mph, this is most likely a measurement within a :

- W) typical thunder storm
- X) tornado
- Y) hurricane
- Z) microburst

ANSWER: X) TORNADO

BONUS

5) **EARTH SCIENCE** *Multiple Choice* S-waves produced by earthquakes, do not travel through the Earth's:

- W) crust
- X) mantle
- Y) outer core
- Z) lithosphere

ANSWER: Y) OUTER CORE

TOSS-UP

6) **PHYSICAL SCIENCE** *Multiple Choice* What causes skin to sunburn after prolonged exposure to sunlight?

- W) infrared light
- X) X-rays
- Y) ultraviolet light
- Z) cosmic rays

ANSWER: Y) ULTRAVIOLET LIGHT

BONUS

6) **PHYSICAL SCIENCE** *Short Answer* An automobile traveling at 100 kilometers per hour has how many more times the kinetic energy than the same vehicle traveling at 50 kilometers per hour?

ANSWER: 4 TIMES

TOSS-UP

*7) **PHYSICAL SCIENCE** *Multiple Choice* The melting of lead, the freezing of water, and the sublimation of dry ice, are all examples of which of the following:

- W) chemical reactions
- X) separation processes
- Y) condensation processes
- Z) physical changes

ANSWER: Z) PHYSICAL CHANGES

BONUS

*7) **PHYSICAL SCIENCE** *Short Answer* If a 90 kilogram object displaces 30 kilograms of water when immersed, what will its apparent weight be?

ANSWER: 60 KILOGRAMS (ACCEPT: 60 KG OR 60,000 GRAMS OR 600 NEWTONS)

TOSS-UP

*8) **GENERAL SCIENCE** *Multiple Choice* Which of the following temperatures in degrees Centigrade most likely corresponds to the hottest day on record anywhere in the USA:

- W) 26 degrees C
- X) 41 degrees C
- Y) 57 degrees C
- Z) 65 degrees C

ANSWER: Y) 57 DEGREES C

BONUS

*8) **GENERAL SCIENCE** *Multiple Choice* We know from solar eclipses that the Moon and the Sun appear in the sky to be:

- W) about the same diameter
- X) much different in size
- Y) in orbit around the Earth
- Z) moving on a collision course

ANSWER: W) ABOUT THE SAME DIAMETER

TOSS-UP

9) **LIFE SCIENCE** *Short Answer* The spines of cacti are a modification of what plant structure?

ANSWER: LEAF

BONUS

9) **LIFE SCIENCE** *Multiple Choice* Which of the following cells would typically be capable of the greatest amount of phagocytosis

- w) plasma cells
- X) lymphocytes
- Y) mast cells
- Z) macrophages

ANSWER: Z) MACROPHAGES

TOSS-UP

10) **MATH** *Multiple Choice* Which of the following is TRUE of the following equation:
 $3x + 9 = 9 + 3x$

- W) the equation is conditional
- X) the equation is an identity
- Y) it is an equation with no solution
- Z) the equation has an infinite number of solutions

ANSWER: X) THE EQUATION IS AN IDENTITY

BONUS

10) **MATH** *Short Answer* What 3 consecutive numbers add up to 39?

ANSWER: 12, 13, AND 14

TOSS-UP

11) **EARTH SCIENCE** *Multiple Choice* The San Andreas Fault in California is an example of what type of plate margin:

- W) divergent margin
- X) convergent margin
- Y) transform fault margin
- Z) subduction margin

ANSWER: Y) TRANSFORM FAULT MARGIN

BONUS

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

ANSWER: CORUNDUM; QUARTZ; FLUORITE

TOSS-UP

12) **PHYSICAL SCIENCE** *Multiple Choice* Which of the following is largely responsible for the characteristic bad odor of a rotten egg?

- W) sulfuric acid
- X) hydrogen sulfide
- Y) sodium chloride
- Z) nitrogen oxide

ANSWER: X) HYDROGEN SULFIDE

BONUS

*12) **PHYSICAL SCIENCE** *Multiple Choice* Which of the following solutions will conduct electricity the best?

- W) sugar and distilled water
- X) alcohol and distilled water
- Y) sodium chloride and distiller water
- Z) moth balls and alcohol

ANSWER: Y) SODIUM CHLORIDE AND DISTILLER WATER

TOSS-UP

13) **GENERAL SCIENCE** *Short Answer* If Todd weighs 88 pounds, rounded to the nearest whole number, how much does he weigh in kilograms?

ANSWER: 40

BONUS

*13) **GENERAL SCIENCE** *Multiple Choice* Which of the following U.S. year 2001 coins is closest in diameter to 2 cm?

- W) a dollar
- X) a quarter
- Y) a dime
- Z) a penny

ANSWER: Z) A PENNY

TOSS-UP

14) **EARTH SCIENCE** *Short Answer* How many times does the Moon appear as half-full during a single lunar cycle?

ANSWER: 2

BONUS

14) **EARTH SCIENCE** *Multiple Choice* Which of the following is true of the Hawaiian chain of islands:

- W) they show increasing age from the northwest to the southeast
- X) they are thought to be the result of the lithosphere moving over a hot spot
- Y) they represent what could happen when plates interact at a convergent boundary
- Z) all the islands have approximately the same age

ANSWER: X) THEY ARE THOUGHT TO BE THE RESULT OF THE LITHOSPHERE MOVING OVER A HOT SPOT

TOSS-UP

***15) PHYSICAL SCIENCE** *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

***15) PHYSICAL SCIENCE** *Multiple Choice* The centrifugal effect perceived by a person on a carousel is most accurately attributed to which of the following:

- W) friction
- X) a stationary frame of reference
- Y) constant velocity and accelerating angular momentum
- Z) inertia

ANSWER: Z) INERTIA

TOSS-UP

16) MATH *Short Answer* Add the following: $3\frac{1}{2} + 2\frac{1}{3} + 1\frac{1}{12} =$

ANSWER: $6\frac{11}{12}$

BONUS

16) MATH *Short Answer* What is the average speed, in miles per hour, of a person who travels 120 miles in 3 hours, 40 miles the next 3 hours, and 36 miles the following 2 hours?

ANSWER: 24.5 (ACCEPT: 24 – 25)

TOSS-UP

*17) **EARTH SCIENCE** *Short Answer* The red color of Navajo sand stone is primarily because of the presence of what element?

ANSWER: IRON

BONUS

17) **EARTH SCIENCE** *Multiple Choice* It is estimated that the temperature of the Earth's core is:

- W) as hot as the surface of the sun
- X) much hotter than the surface of the sun
- Y) much cooler than the surface of the sun
- Z) it cannot be estimated

ANSWER: W) AS HOT AS THE SURFACE OF THE SUN

TOSS-UP

*18) **EARTH SCIENCE** *Multiple Choice* If the full moon rises in Nebraska at about 9 p.m., which of the following will most likely be the approximate time it rises the next day?

- W) 7:30 p.m.
- X) 8:45 p.m.
- Y) 9:00 p.m.
- Z) 9:50 p.m.

ANSWER: Z) 9:50 P.M.

BONUS

18) **EARTH SCIENCE** *Short Answer* Name 2 places on earth where continental glaciers exist:

ANSWER: ANTARCTICA AND GREENLAND

TOSS-UP

19) **LIFE SCIENCE** *Multiple Choice* Which of the following is a monocot:

- W) *Acer rubrum*
- X) *Quercus rubra*
- Y) *Zea mays*
- Z) *Echinacea angustifolia*

ANSWER: Y) *Zea mays*

BONUS

*19) **LIFE SCIENCE** *Multiple Choice* Which of the following is TRUE about a typical liver cell:

- W) most genes are arranged in operon-like clusters
- X) it has very few mitochondria
- Y) most genes are transcribed continuously
- Z) most of the DNA does not code for proteins

ANSWER: Z) MOST OF THE DNA DOES NOT CODE FOR PROTEINS

TOSS-UP

20) **MATH** *Short Answer* How many degrees are in one internal angle of a regular pentagon?

ANSWER: 108°

BONUS

20) **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

21) **LIFE SCIENCE** *Multiple Choice* Which of the following is the best description of a cell membrane also known as the plasma membrane?

- W) it is permeable and made of mostly proteins
- X) it is semi-permeable and made mostly of proteins in a lipid bilayer
- Y) it is impermeable and made up mostly of lipids
- Z) it is a fluid mosaic composed of a protein bilayer

ANSWER: X) IT IS SEMI-PERMEABLE AND MADE MOSTLY OF PROTEINS IN A LIPID BILAYER

BONUS

*21) **LIFE SCIENCE** *Multiple Choice* The development of embryonic cells that allows them to become different specialized cells of different organs and tissue and then function in very different ways in an adult organism is best explained by which of the following:

- W) they have evolved different genomes
- X) they each contain different genes
- Y) they use different genetic codes
- Z) different genes are expressed or turned on and off in different cells

ANSWER: Z) DIFFERENT GENES ARE EXPRESSED OR TURNED ON AND OFF IN DIFFERENT CELLS

TOSS-UP

*22) **PHYSICAL SCIENCE** *Multiple Choice* To describe a force you must give:

- W) the origin of the force
- X) its magnitude
- Y) the mass of an object
- Z) its direction and magnitude

ANSWER: Z) ITS DIRECTION AND MAGNITUDE

BONUS

*22) **PHYSICAL SCIENCE** *Short Answer* Order the following substances from the LEAST dense to the MOST dense: gold, water at 1°C, water at 4°C, iron

ANSWER: WATER AT 1°C; WATER AT 4°C; IRON; GOLD
(Solution: water is most dense at 3.98)

TOSS-UP

*23) **GENERAL SCIENCE** *Short Answer* A person who had polydactyilia would have too many of what?

ANSWER: DIGITS (ACCEPT: FINGERS AND/OR TOES)

BONUS

*23) **GENERAL SCIENCE** *Short Answer* Consider a tree that grows 20 centimeters taller each year. If you marked a spot 100 centimeters from ground level up the trunk of the tree, about how high from the ground would the mark be in 6 years?

ANSWER: 100 CENTIMETERS [ACCEPT: BETWEEN 90-110 CENTIMETERS]

TOSS-UP

24) **GENERAL SCIENCE** *Short Answer* Which of the following is the largest in length? A light year, 1,860,000 miles, a parsec, a furlong, a hectometer

ANSWER: A PARSEC

BONUS

*24) **GENERAL SCIENCE** *Short Answer* Order the following from the most acidic to the most basic: household liquid ammonia, milk, tomato juice, pure water.

ANSWER: TOMATO JUICE, PURE WATER, MILK, HOUSEHOLD LIQUID AMMONIA

TOSS-UP

25) **LIFE SCIENCE** *Multiple Choice* Passive transport differs mostly from active transport since passive transport requires:

- W) ATP
- X) spectrin proteins
- Y) no energy
- Z) mitochondria

ANSWER: Y) NO ENERGY

BONUS

*25) **LIFE SCIENCE** *Multiple Choice* After taking 20 readings of the outside winter air temperature during an experiment, Kathy realizes that the first reading is more than 20% higher than all the following readings. She quickly remembers that she forgot to allow the thermometer, which was stored in a warm room, to adjust to the outside temperature. Which of the following is the most appropriate solution to her problem of what seems to be an experimental error:

- W) discuss the error with the other scientists and then discard the reading
- X) repeat the experiment, and if no other readings are unusually high she can discard the initial high reading as long as she explains why
- Y) repeat the experiment and average in the high reading
- Z) buy a new thermometer

ANSWER: Y) REPEAT THE EXPERIMENT AND AVERAGE IN THE HIGH READING