

ROUND 4 A

TOSS-UP

1) PHYSICAL SCIENCE *Multiple Choice* What is the primary component of natural gas?

- W) Methane
- X) Helium
- Y) Hydrogen
- Z) Oil

ANSWER: W) METHANE

BONUS

1) PHYSICAL SCIENCE *Multiple Choice* The second electron shell in an atom can hold up to how many electrons, and contains how many different orbital shapes, respectively?

- W) 8, 2
- X) 2, 8
- Y) 4, 8
- Z) 8, 4

ANSWER: W) 8, 2

TOSS-UP

2) EARTH AND SPACE *Multiple Choice* Which of the following types of organisms does NOT utilize oxygen for respiration?

- W) Aerobic
- X) Anaerobic [**an-uh-ROH-bik**]
- Y) Autotrophic
- Z) Abiogenetic [**ay-by-oh-juh-NET-ik**]

ANSWER: X) ANAEROBIC

BONUS

2) EARTH AND SPACE *Short Answer* On what part of the Earth does every day have exactly the same number of hours of day and night?

ANSWER: EQUATOR

TOSS-UP

3) MATH *Multiple Choice* What is the equation of the line parallel to the x-axis and four units above the x-axis?

W) $x = -4$

X) $x = 4$

Y) $y = -4$

Z) $y = 4$

ANSWER: Z) $y = 4$

BONUS

3) MATH *Short Answer* Simplify the expression: $-3x + 12x^3 - 17x^2 + 5x^3 - 7x + 11x^2$.

ANSWER: $17x^3 - 6x^2 - 10x$

TOSS-UP

4) ENERGY *Short Answer* What SI unit is used to describe the power of a motor or electric heater?

ANSWER: WATT

BONUS

4) ENERGY *Multiple Choice* Why is it best to hit a baseball on the sweet spot of a bat?

W) There is less friction on the sweet spot

X) The sweet spot is the widest part of the bat so it easier to hit the ball

Y) When the ball hits the sweet spot more force is imparted to it

Z) Less energy is lost to bat vibrations when the ball hits the sweet spot

ANSWER: Z) LESS ENERGY IS LOST TO BAT VIBRATIONS WHEN THE BALL HITS THE SWEET SPOT

TOSS-UP

5) LIFE SCIENCE *Multiple Choice* Charles Darwin used what process to illustrate the mechanisms of natural selection?

- W) Artificial selection
- X) Biology
- Y) Natural history
- Z) Evolution

ANSWER: W) ARTIFICIAL SELECTION

BONUS

5) LIFE SCIENCE *Multiple Choice* The majority of ocean organisms living in hydrothermal vents are believed to be which of the following?

- W) Protists
- X) Coral
- Y) Bacteria
- Z) Eels

ANSWER: Y) BACTERIA

TOSS-UP

6) GENERAL SCIENCE *Multiple Choice* What is the reproductive part of an angiosperm that will eventually develop into a seed?

- W) Endosperm
- X) Ovule [**OV-yool**]
- Y) Stamen
- Z) Phloem [**FLOH-em**]

ANSWER: X) OVULE

BONUS

6) GENERAL SCIENCE *Short Answer* In aerobic respiration, what is the terminal electron acceptor in the electron transport chain?

ANSWER: OXYGEN

TOSS-UP

7) PHYSICAL SCIENCE *Multiple Choice* Why does the same side of the Moon always face the Earth?

- W) The Moon rotates about its axis about once per month
- X) The Moon rotates about its axis about once per year
- Y) The Moon and the Earth rotate about their axes at the same rate
- Z) The Moon does not rotate about its axis

ANSWER: W) THE MOON ROTATES ABOUT ITS AXIS ABOUT ONCE PER MONTH

BONUS

7) PHYSICAL SCIENCE *Short Answer* You have some old silver coins and want to buy some more at the flea market. The seller shows you some old coins that look nearly identical to the ones you already have. What attribute could be measured to determine which coins are made of silver without destroying the coins?

ANSWER: DENSITY (ACCEPT: MASS, RESISTIVITY)

TOSS-UP

8) ENERGY *Multiple Choice* As a swing rises in the air, which of the following types of energy increases in the rider?

- W) Kinetic
- X) Thermal
- Y) Potential
- Z) Mechanical

ANSWER: Y) POTENTIAL

BONUS

8) ENERGY *Short Answer* Of the approximately 12% of U.S. electricity production that comes from renewable resources, which source makes up 50-60% of this production?

ANSWER: HYDROPOWER

TOSS-UP

9) EARTH AND SPACE *Short Answer* Cyclones forming in the northern hemisphere spin in what direction?

ANSWER: COUNTERCLOCKWISE

BONUS

9) EARTH AND SPACE *Multiple Choice* Which of the following is NOT considered part of the nitrogen cycle?

W) Ammonification

X) Nitrification

Y) Methanogenesis [*muh-thahn-uh-JEN-uh-sis*]

Z) Nitrogen fixation

ANSWER: Y) METHANOGENESIS

TOSS-UP

10) MATH *Short Answer* Consider the following expression: $5x^2 + 16xy - 7y^2$. What is the coefficient of the second term?

ANSWER: 16

BONUS

10) MATH *Short Answer* If the radius of a sphere is cut in half, what is the ratio of the volume of the new sphere to the volume of the original sphere?

ANSWER: 1 TO 8 (ACCEPT: 1/8, 0.125, 12.5%)

TOSS-UP

11) LIFE SCIENCE *Short Answer* In what specific phase of meiosis [*my-OH-sis*] do homologous [*huh-MOL-uh-guhs*] chromosomes pair up?

ANSWER: PROPHASE I

BONUS

11) LIFE SCIENCE *Multiple Choice* Which organism has a lateral line system?

- W) Shark
- X) Jellyfish
- Y) Limpet
- Z) Starfish

ANSWER: W) SHARK

TOSS-UP

12) GENERAL SCIENCE *Multiple Choice* What is an eddy?

- W) A young kangaroo
- X) Another name for a tornado
- Y) A circular current of water
- Z) Another name for a rip current

ANSWER: Y) A CIRCULAR CURRENT OF WATER

BONUS

12) GENERAL SCIENCE *Short Answer* What is the name for the type of viruses that specifically infect bacteria?

ANSWER: BACTERIOPHAGES (ACCEPT: PHAGE)

TOSS-UP

13) PHYSICAL SCIENCE *Multiple Choice* Which of the following is NOT one of the properties of forces?

- W) Net forces always change velocity
- X) Forces can cause a change in motion
- Y) Forces can cancel each other out
- Z) Forces in opposite directions always result in an unbalanced net force

ANSWER: Z) FORCES IN OPPOSITE DIRECTIONS ALWAYS RESULT IN AN UNBALANCED NET FORCE

BONUS

13) PHYSICAL SCIENCE *Multiple Choice* How many moles of carbon dioxide are required to react with 2 moles of water to form carbonic acid?

- W) 1
- X) 2
- Y) 2.5
- Z) 4

ANSWER: X) 2

TOSS-UP

14) EARTH AND SPACE *Short Answer* When a stone weathers, its tendency to become more rounded is known as what kind of weathering?

ANSWER: SPHEROIDAL (ACCEPT: WOOLSACK)

BONUS

14) EARTH AND SPACE *Multiple Choice* New oceanic crust is formed at which of the following?

- W) Subduction zones
- X) Island arcs
- Y) Transform faults
- Z) Mid-ocean ridges

ANSWER: Z) MID-OCEAN RIDGES

TOSS-UP

15) MATH *Short Answer* Three pages are randomly chosen out of a textbook. The number of words on each page is 450, 447, and 456, respectively. What is the average number of words per page of the sampled pages?

ANSWER: 451

BONUS

15) MATH *Short Answer* Your phone company charges 50 cents to place a long distance phone call and 17 cents per minute talked. If you spent \$4.58 on a phone call, how long in minutes did it last?

ANSWER: 24

TOSS-UP

16) LIFE SCIENCE *Multiple Choice* What organ in the human body is responsible for storing glucose in the form of glycogen **[GLY-kuh-juhn]**?

- W) Pancreas
- X) Kidney
- Y) Liver
- Z) Spleen

ANSWER: Y) LIVER

BONUS

16) LIFE SCIENCE *Multiple Choice* A biologist wants to test the effect of a new food additive on growth in rats. An experimental group was fed a diet containing the additive. Which of the following would be an effective control group?

- W) A group of rats that ate a higher concentration of food additive
- X) A group of rats that were kept in different conditions across the city
- Y) A group of rats that were fed the same ration without the food additive
- Z) A group of rats that ate a lower concentration of the food additive

ANSWER: Y) A GROUP OF RATS THAT WERE FED THE SAME RATION WITHOUT THE FOOD ADDITIVE

TOSS-UP

17) GENERAL SCIENCE *Multiple Choice* Bats use what system to navigate in darkness?

- W) Echolocation
- X) Sound waves
- Y) Radar
- Z) Vibration

ANSWER: W) ECHOLOCATION

BONUS

17) GENERAL SCIENCE *Short Answer* Of the types of radiation involving the decay of the nucleus [**NOO-klee-uhs**] of an atom, which one results in the release of an electron?

ANSWER: BETA

TOSS-UP

18) PHYSICAL SCIENCE *Short Answer* If a fireman turns on his water hose and is knocked backwards; of which of Newton's three laws of motion is this an example?

ANSWER: THE THIRD LAW

BONUS

18) PHYSICAL SCIENCE *Multiple Choice* Which of the following is a metalloid?

- W) Iron
- X) Silicon
- Y) Mercury
- Z) Selenium

ANSWER: X) SILICON

TOSS-UP

19) ENERGY *Short Answer* What is the term for a chemical reaction that absorbs heat as the reaction proceeds?

ANSWER: ENDOTHERMIC (ACCEPT: ENDERGONIC)

BONUS

19) ENERGY *Multiple Choice* Which of the following is the most common and likely source of exposure to harmful radiation for most people?

- W) Discovering a piece of abandoned equipment from the nuclear industry
- X) Exposure to a spent fuel rod
- Y) Living near a nuclear power plant
- Z) Radon exposure in the home

ANSWER: Z) RADON EXPOSURE IN THE HOME

TOSS-UP

20) EARTH AND SPACE *Short Answer* If a telescope is left unguided, what will be observed in long-exposure photographs taken through it?

ANSWER: STAR TRAILS

BONUS

20) EARTH AND SPACE *Multiple Choice* Most continents contain large central areas in which very ancient rocks are exposed. What are these areas called?

- W) Shields
- X) Cratons
- Y) Platforms
- Z) Orogenic belts

ANSWER: X) CRATONS

TOSS-UP

21) MATH *Short Answer* A mission to an alien planet discovers sentient beings that have developed a currency system using krats, shans, and lars. They tell you that 6 krats equal 15 shans, and 15 shans equal 45 lars. You know from your math classes on Earth that 6 krats therefore equal 45 lars. What property does this demonstrate?

ANSWER: TRANSITIVE (ACCEPT: TRANSITIVE PROPERTY OF EQUALITY)

BONUS

21) MATH *Multiple Choice* Solve for x : $\sqrt{x - 4} = -7$ [**the square root of the quantity x minus 4 equals negative 7**].

W) -45

X) -3

Y) 53

Z) \emptyset [**Null set**]

ANSWER: Z) \emptyset

TOSS-UP

22) LIFE SCIENCE *Multiple Choice* The kingdom Plantae [**PLAN-tee**] consists of members that are which of the following?

W) Non-photosynthetic, multicellular, and eukaryotic [**yoo-KAR-ee-oh-tik**]

X) Photosynthetic, multicellular, and eukaryotic

Y) Photosynthetic, multicellular, and prokaryotic [**proh-KAR-ee-oh-tik**]

Z) Photosynthetic, unicellular, and prokaryotic

ANSWER: X) PHOTOSYNTHETIC, MULTICELLULAR, AND EUKARYOTIC

BONUS

22) LIFE SCIENCE *Short Answer* What is the source of light in the deep ocean?

ANSWER: BIOLUMINESCENT ANIMALS (ACCEPT: BIOLUMINESCENCE)

TOSS-UP

23) GENERAL SCIENCE *Short Answer* What term describes the outer solid part of the Earth, including the crust and uppermost mantle.

ANSWER: LITHOSPHERE

BONUS

23) GENERAL SCIENCE *Multiple Choice* You are trying to decide what to wear to school today and feel like wearing something green. You turn on the incandescent light in your closet and pull out a green shirt. Why does the shirt look green?

W) The shirt is giving off a green light

X) The shirt absorbs the green wavelengths of the visible light spectrum and reflects all others

Y) The shirt reflects the green wavelengths of the visible light spectrum and absorbs all others

Z) The shirt absorbs the white wavelengths of the visible light spectrum and converts the others into visible green wavelengths

ANSWER: Y) THE SHIRT REFLECTS THE GREEN WAVELENGTHS OF THE VISIBLE LIGHT SPECTRUM AND ABSORBS ALL OTHERS