

ROUND 10

TOSS-UP

1) GENERAL SCIENCE *Short Answer* One degree of latitude at the Earth's surface is equal to how many nautical miles?

ANSWER: 60

BONUS

1) GENERAL SCIENCE *Short Answer* Arrange the following 4 liquid measures from the one with the SMALLEST volume to the LARGEST: 1.5 gallons; 128 ounces; 1 deciliter; 2 liters

ANSWER: 1 DECILITER; 2 LITERS; 128 OUNCES; 1.5 GALLONS

TOSS-UP

2) LIFE SCIENCE *Multiple Choice* Cartilage belongs to which of the following animal tissues types:

- W) epithelial
- X) connective
- Y) nervous
- Z) muscle

ANSWER: X) CONNECTIVE

BONUS

2) LIFE SCIENCE *Short Answer* Name all of the following 3 chemicals that are NOT amino acids: glycine; methionine; adenine

ANSWER: ADENINE

TOSS-UP

3) PHYSICAL SCIENCE *Multiple Choice* Which of the following **MUST** change if constructive interference occurs between two light waves:

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

ANSWER: Y) AMPLITUDE

BONUS

3) PHYSICAL SCIENCE *Short Answer* Order the following 4 colors of light from the one with the **LONGEST** wavelength to the **SHORTEST** wavelength: orange; violet; red; yellow

ANSWER: RED; ORANGE; YELLOW; VIOLET

TOSS-UP

4) EARTH SCIENCE *Multiple Choice* In which of the following climates are the **WIDEST** ANNUAL temperature variations or temperature ranges most likely to occur:

- W) continental polar
- X) moist tropical
- Y) tropical savanna
- Z) mid-latitude moist continental

ANSWER: Z) MID-LATITUDE MOIST CONTINENTAL

(Solution: hot summers and cold winters; polar fronts moving northward or southward)

BONUS

4) EARTH SCIENCE *Multiple Choice* Which of the following is **NOT** true of the ozone layer:

- W) beneficial stratospheric ozone is produced naturally and harmful tropospheric ozone is human-made
- X) the ozone molecule has 3 oxygen atoms
- Y) in addition to chlorine, bromine is also responsible for combining with and breaking down the ozone molecule
- Z) holes in the ozone layer are produced by global warming

ANSWER: Z) HOLES IN THE OZONE LAYER ARE PRODUCED BY GLOBAL WARMING

TOSS-UP

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

- W) the largest angle in a right triangle is 90°
- X) each side of a regular polygon has the same length
- Y) the side opposite an obtuse angle is the shortest side of a triangle
- Z) a triangle can have only 1 obtuse angle

ANSWER: Y) THE SIDE OPPOSITE AN OBTUSE ANGLE IS THE SHORTEST SIDE OF A TRIANGLE

BONUS

5) MATH *Short Answer* In her first year after graduating college, Lucy earned \$25,000 in her first full-time job. Five years later her salary had risen by 300%. What is her current salary?

ANSWER: \$100,000.00

TOSS-UP

6) GENERAL SCIENCE *Multiple Choice* Acid-base indicators are substances that change color with changing pH and are usually derived from:

- W) plants
- X) animals
- Y) chemical sedimentary rocks
- Z) alkaline Earth metal

ANSWER: W) PLANTS

BONUS

6) GENERAL SCIENCE *Short Answer* Of all the essential minerals present in the human body, which one is the most abundant?

ANSWER: CALCIUM

TOSS-UP

7) LIFE SCIENCE *Short Answer* How many chromosomes does a normal human gamete have?

ANSWER: 23

BONUS

7) LIFE SCIENCE *Multiple Choice* Which of the following is most directly responsible for the exchange of genes during meiosis:

- W) crossing over
- X) kinetochores division
- Y) cytokinesis
- Z) alleles

ANSWER: W) CROSSING OVER

TOSS-UP

8) PHYSICAL SCIENCE *Multiple Choice* Which of the following is an electronic device that amplifies electronic signals and was used as a switching device in the first electronic computers:

- W) vacuum tubes
- X) crystals
- Y) potentiometers
- Z) rheostats

ANSWER: W) VACUUM TUBES

BONUS

8) PHYSICAL SCIENCE *Short Answer* Name all of the following 3 choices that are typically considered scalar quantities: electric charge; acceleration; average speed

ANSWER: ELECTRIC CHARGE; AVERAGE SPEED

TOSS-UP

9) EARTH SCIENCE *Multiple Choice* Which of the following is LEAST accurate:

- W) basalt is the fine-grained equivalent of gabbro
- X) any rock can be metamorphosed
- Y) the chemical composition of magma primarily determines its texture
- Z) a metamorphic rock produced from sandstone is quartzite

ANSWER: Y) THE CHEMICAL COMPOSITION OF MAGMA PRIMARILY DETERMINES ITS TEXTURE

(Solution: texture is primarily determined by cooling)

BONUS

9) EARTH SCIENCE *Short Answer* What term is used to describe the resistance of lava to flow as reflected by its gas content, temperature, and chemical composition?

ANSWER: VISCOSITY

TOSS-UP

10) MATH *Short Answer* By words or number, name all of the following 3 statements which are ALWAYS TRUE:

- 1) a trapezoid has a pair of parallel sides
- 2) two triangles with the same area have the same perimeter
- 3) if 2 straight lines intersect, vertical angles have the same measure

ANSWER: 1 AND 3

BONUS

10) MATH *Short Answer* The following daily Fahrenheit temperatures were recorded over a 5-day period: -15° , 2° , 0° , 13° , and -5° . Find the average daily temperature for this period, in degrees Fahrenheit:

ANSWER: -1

TOSS-UP

11) GENERAL SCIENCE *Multiple Choice* Which of the following is LEAST accurate regarding acid rain:

- W) forests are not negatively impacted because they are naturally resistant to acidic pH's
- X) lakes with limestone bedrock have some natural protection against acidification
- Y) lakes with pH's of less than 5 are largely devoid of fish
- Z) more than half the acid deposition in eastern Canada originates from U.S. emissions

ANSWER: W) FORESTS ARE NOT NEGATIVELY IMPACTED BECAUSE THEY ARE NATURALLY RESISTANT TO ACIDIC pH'S

BONUS

11) GENERAL SCIENCE *Short Answer* During the proton-proton chain that occurs during the fusion process of a main sequence star, how many hydrogen atoms are typically needed to produce a helium atom?

ANSWER: 4

TOSS-UP

12) LIFE SCIENCE *Short Answer* What base nucleotide is replaced by uracil in RNA?

ANSWER: THYMINE

BONUS

12) LIFE SCIENCE *Short Answer* What two functional groups of amino acids join to form a peptide bond in a protein?

ANSWER: CARBOXYL AND AMINO (in any order)

TOSS-UP

13) PHYSICAL SCIENCE *Multiple Choice* Which of the following is NOT true for a substance:

- W) pure substances always contain the same ratio of elements
- X) water and steam are 2 different forms of the same substance
- Y) all compounds are substances and all substances are compounds
- Z) a pure substance cannot be separated by physical means

ANSWER: Y) ALL COMPOUNDS ARE SUBSTANCES AND ALL SUBSTANCES ARE COMPOUNDS

BONUS

13) PHYSICAL SCIENCE *Multiple Choice* Which of the following is NOT a spontaneous reaction under normal atmospheric pressure:

- W) rusting of a ship's hull at sea
- X) liquid water changing to water ice at 25°C
- Y) the combustion of propane in air
- Z) evaporation of water above 212°F

ANSWER: X) LIQUID WATER CHANGING TO WATER ICE AT 25°C

TOSS-UP

14) GENERAL SCIENCE *Multiple Choice* Which of the following is a water-purification process that uses pressure across a semi-permeable membrane:

- W) filtering with activated charcoal
- X) ultraviolet treatments
- Y) reverse osmosis
- Z) ozonation

ANSWER: Y) REVERSE OSMOSIS

BONUS

14) GENERAL SCIENCE *Short Answer* How many liters of water will completely fill a container measuring 100 centimeters by 1 meter by 80 centimeters?

ANSWER: 800

(Solution: $(100\text{ cm} \times 100\text{ cm} \times 80\text{ cm})(1\text{ L}/1000\text{ cm}^3) = 800\text{ L}$)

TOSS-UP

15) EARTH SCIENCE *Multiple Choice* During which of the following months will the Sun rise exactly in the east to an observer at mid-northern latitudes:

- W) December
- X) March
- Y) June
- Z) September

ANSWER: X) MARCH

BONUS

15) EARTH SCIENCE *Multiple Choice* Which of the following is a type of volcanic eruption that does not build up into the typical cone shape normally associated with volcanoes, even though it erupts huge volumes of fluid lava:

- W) composite
- X) fissure
- Y) Krakatoan
- Z) Strombolian

ANSWER: X) FISSURE

TOSS-UP

16) MATH *Short Answer* Simplify the following completely: $(-2x^2y^3)^3$

ANSWER: $-8x^6y^9$

BONUS

16) MATH *Short Answer* The outdoor temperature at 6:00 AM is -8°C . If it rises at a rate of 3°C per hour, what is the temperature, in degrees Celsius, at noon?

ANSWER: 10

TOSS-UP

17) LIFE SCIENCE *Multiple Choice* Which of the following is the botanical term for the haploid generation in moss plants:

- W) gametophyte
- X) archegonia
- Y) style
- Z) ovule

ANSWER: W) GAMETOPHYTE

BONUS

17) LIFE SCIENCE *Short Answer* Name all of the following 3 organisms that belong to the phylum Cnidaria (read as: nid-AIR-ee-ah): jellyfish; sea anemones; corals

ANSWER: JELLYFISH; CORALS

TOSS-UP

18) PHYSICAL SCIENCE *Multiple Choice* Which of the following is a substance that does NOT conduct electricity when it is a solid but does conduct electricity when it is melted or in a molten state:

- W) lead
- X) copper
- Y) water
- Z) sodium chloride

ANSWER: Z) SODIUM CHLORIDE

BONUS

18) PHYSICAL SCIENCE *Multiple Choice* Chemical bonding between which of the following pairs of atoms would MOST likely be ionic:

- W) copper and chlorine
- X) carbon and carbon
- Y) hydrogen and carbon
- Z) sulfur and oxygen

ANSWER: W) COPPER AND CHLORINE

TOSS-UP

19) EARTH SCIENCE *Multiple Choice* Which of the following is a phenomenon associated with extensive warming of the ocean in the tropical regions of the eastern Pacific:

- W) El Nino
- X) a Chinook
- Y) La Nina
- Z) the Ekman spiral

ANSWER: W) EL NINO

BONUS

19) EARTH SCIENCE *Multiple Choice* Which of the following is LEAST indicated by closely spaced isobars on a weather map:

- W) strong winds
- X) a steep gradient between high and low pressure areas
- Y) a frontal boundary
- Z) type of precipitation

ANSWER: Z) TYPE OF PRECIPITATION

TOSS-UP

20) MATH *Short Answer* Solve the following equation for x: $\frac{5}{8}x = 200$

ANSWER: 320

BONUS

20) MATH *Short Answer* A certain ore contains 2% of a precious metal. How many tons of ore must theoretically be mined to obtain 16 tons of the metal?

ANSWER: 800

TOSS-UP

21) GENERAL SCIENCE *Short Answer* What precious metal is the catalyst in most automobile catalytic converters?

ANSWER: PLATINUM

BONUS

21) GENERAL SCIENCE *Short Answer* What is the most common name for the apparent circular movement of the celestial poles against the background of fixed stars that will eventually result in Polaris drifting away from the north celestial pole?

ANSWER: PRECESSION

TOSS-UP

22) LIFE SCIENCE *Short Answer* What staining method is used to generally divide bacteria into two groups?

ANSWER: GRAM STAIN

BONUS

22) LIFE SCIENCE *Short Answer* Name all of the following 4 cellular structures that are found in plant cells and NOT bacteria: mitochondria; chloroplasts; cell membranes; ribosomes

ANSWER: MITOCHONDRIA; CHLOROPLASTS

TOSS-UP

23) PHYSICAL SCIENCE *Short Answer* How many covalent bonds are in a molecule of methane?

ANSWER: 4

BONUS

23) PHYSICAL SCIENCE *Short Answer* Giving your answer in the SI units for resistance, what is the resistance of an electric flashlight operating on a 9-volt battery that requires 0.5 amps to run?

ANSWER: 18 OHMS (must give units)

(Solution: $R = V/I = 9/0.5 = 18$ ohms)

TOSS-UP

24) EARTH SCIENCE *Multiple Choice* Which of the following is NOT an example of typical Jurassic vegetation:

- W) flowering plants
- X) ferns
- Y) conifers
- Z) ginkgoes

ANSWER: W) FLOWERING PLANTS

BONUS

24) EARTH SCIENCE *Multiple Choice* Which of the following is TRUE:

- W) all tropical depressions form into tropical storms
- X) the Intertropical Convergence Zone is mostly located near the equator
- Y) most hurricanes originate along the equator
- Z) all hurricanes have a counterclockwise motion

ANSWER: X) THE INTERTROPICAL CONVERGENCE ZONE IS MOSTLY LOCATED NEAR THE EQUATOR

TOSS-UP

25) MATH *Short Answer* Find the product of $(x^{3y})(x^{2y})$

ANSWER: x^{5y}

BONUS

25) MATH *Short Answer* Find the following product and give your answer to the first decimal

place: $\left(\frac{5}{3}\right)\left(\frac{3}{5}\right)^2$

ANSWER: 0.6