

ROUND 13

TOSS-UP

1) EARTH SCIENCE *Multiple Choice* The upper limit of the zone of saturation is the:

- W) watershed
- X) water table
- Y) precipitation zone
- Z) Darcy zone

ANSWER: X) WATER TABLE

BONUS

1) EARTH SCIENCE *Multiple Choice* Which of the following ground-level forms of precipitation results when supercooled water droplets collide with ice pellets and they freeze together:

- W) sleet
- X) hail
- Y) snow
- Z) rain

ANSWER: X) HAIL

TOSS-UP

2) MATH *Short Answer* Expand the following expression, giving your answer in standard form:

$$\left(x - \frac{1}{4}\right)^2$$

ANSWER: $x^2 - \frac{x}{2} + \frac{1}{16}$ (ACCEPT: $x^2 - \frac{1}{2}x + \frac{1}{16}$)

BONUS

2) MATH *Short Answer* If \$1,000 is invested at a simple interest rate of 10% annually, at the end of 3 years, what is the total interest earned?

ANSWER: \$300

(Solution: $I = Prt = (1000)(0.10)(3) = \300.00)

TOSS-UP

3) GENERAL SCIENCE *Short Answer* Most nuclear reactors in the U.S. use what element as their fuel for fission?

ANSWER: URANIUM (ACCEPT: URANIUM-235)

BONUS

3) GENERAL SCIENCE *Multiple Choice* Which of the following is TRUE regarding cooking with water:

- W) rice cooking at a vigorous boil in an open pot is at a higher temperature than at a slow boil
- X) pressure cookers increase the boiling point of water so that food cooks faster
- Y) cooking times in Miami, Florida are longer than in Denver, Colorado
- Z) live steam is used in most electric rice cookers

ANSWER: X) PRESSURE COOKERS INCREASE THE BOILING POINT OF WATER SO THAT FOOD COOKS FASTER

TOSS-UP

4) LIFE SCIENCE *Multiple Choice* Phylogenetic systems of classifying organisms into various groups are mostly based on:

- W) physical appearances
- X) numbers of genes
- Y) evolutionary history
- Z) environmental origins

ANSWER: Y) EVOLUTIONARY HISTORY

BONUS

4) LIFE SCIENCE *Multiple Choice* Which of the following are homologous structures:

- W) wing of a bat and the arm of a human
- X) leg of a cat and the wing of a fly
- Y) stinger of a bee and the fang of a snake
- Z) rattler of a rattle snake and the whistle of a song bird

ANSWER: W) WING OF A BAT AND THE ARM OF A HUMAN

TOSS-UP

5) PHYSICAL SCIENCE *Short Answer* What color light will be produced when combining equal proportions of green and blue light?

ANSWER: CYAN

BONUS

5) PHYSICAL SCIENCE *Short Answer* Order the following 4 forms of electromagnetic radiation from the one with the SHORTEST wavelength to the LONGEST wavelength:
ultraviolet; microwave; gamma; FM radio

ANSWER: GAMMA; ULTRAVIOLET; MICROWAVE; FM RADIO

TOSS-UP

6) EARTH SCIENCE *Multiple Choice* About what percent of the Northern Hemisphere is continental land mass:

- W) 20
- X) 40
- Y) 60
- Z) 80

ANSWER: X) 40

BONUS

6) EARTH SCIENCE *Multiple Choice* Which of the following atmospheric gases is found on Earth and on our two closest planetary neighbors, but is found in much higher concentrations in Earth's atmosphere:

- W) helium
- X) carbon dioxide
- Y) argon
- Z) nitrogen

ANSWER: Z) NITROGEN

(Solution: Earth ~ 78%; Venus ~ 3.5%; Mars ~ 2.7%)

TOSS-UP

7) MATH *Short Answer* Express the following square root in its simplest radical form: $\sqrt{27}$

ANSWER: $3\sqrt{3}$

BONUS

7) MATH *Short Answer* Your grades on your first 3 math tests are 80%, 83% and 90%. What do you need to score on the next test in order to average 87% on the 4 tests?

ANSWER: 95

(Solution: $(80 + 83 + 90 + x)/4 = 87$, $x = 95\%$)

TOSS-UP

8) GENERAL SCIENCE *Multiple Choice* Measuring at 2 feet in length, the hellbender, commonly known as a snot otter or devil dog, found in many streams in the Appalachian and Ozark Mountains of the Eastern United States, are one of the largest species of:

- W) salamanders
- X) jawless fish
- Y) giant catfish
- Z) bright, red-colored frogs with horn-like ears

ANSWER: W) SALAMANDERS

BONUS

8) GENERAL SCIENCE *Multiple Choice* Which of the following is most likely if a healthy hellbender population is found in a stream:

- W) they should be eradicated because they eat all the predatory fish
- X) they are venomous creatures and are a threat to people
- Y) their presence is an excellent indicator that the water quality of the stream is good
- Z) their presence is an excellent indicator that the stream is polluted with heavy metals and PCB's

ANSWER: Y) THEIR PRESENCE IS AN EXCELLENT INDICATOR THAT THE WATER QUALITY OF THE STREAM IS GOOD

TOSS-UP

9) LIFE SCIENCE *Short Answer* What human gland releases thyroid-stimulating hormone and oxytocin (read as: OX-ee-TOE-sin) into the blood?

ANSWER: PITUITARY

BONUS

9) LIFE SCIENCE *Multiple Choice* Ribosomes are made of:

- W) protein only
- X) nucleic acid only
- Y) nucleic acid and protein
- Z) nucleic acid and carbohydrate

ANSWER: Y) NUCLEIC ACID AND PROTEIN

TOSS-UP

10) PHYSICAL SCIENCE *Multiple Choice* Which of the following is LEAST accurate of ionic solids such as NaCl:

- W) they have low melting points
- X) they are salts
- Y) they conduct electricity when dissolved in water
- Z) they dissolve completely in water

ANSWER: W) THEY HAVE LOW MELTING POINTS

BONUS

10) PHYSICAL SCIENCE *Multiple Choice* Knowing that an extensive property of a system is a physical quality whose value DOES depend on the amount of the substance in a system, which of the following is an extensive property:

- W) temperature
- X) melting point
- Y) density
- Z) heat

ANSWER: Z) HEAT

TOSS-UP

11) EARTH SCIENCE *Multiple Choice* Which of the following celestial objects has the closest chemical makeup to the planet Jupiter:

- W) the Sun
- X) the planet Earth
- Y) the planet Mercury
- Z) a Kuiper-belt comet

ANSWER: W) THE SUN

BONUS

11) EARTH SCIENCE *Multiple Choice* Which of the following is NOT prevalent at mid-ocean ridges:

- W) strong earthquakes with deep foci
- X) black smokers
- Y) hydrothermal activity
- Z) rift valleys

ANSWER: W) STRONG EARTHQUAKES WITH DEEP FOCI

TOSS-UP

12) MATH *Short Answer* Express the following radical in simplified form for all positive values

of x : $\sqrt{\left(\frac{x^2}{16}\right)}$

ANSWER: $\frac{x}{4}$ (ACCEPT: $\frac{1}{4}x$)

BONUS

12) MATH *Short Answer* Add the following rational expressions, giving your answer in reduced

form: $\left(\frac{6}{2x}\right) + \left(\frac{3}{x^2}\right)$

ANSWER: $\frac{3(x+1)}{x^2}$ (ACCEPT: $3x + \frac{3}{x^2}$ or $3x + 3x^{-2}$)

TOSS-UP

13) GENERAL SCIENCE *Multiple Choice* Which of the following is a highly contagious disease and is easily spread from person to person by simply coughing or sneezing:

- W) HIV
- X) Lyme disease
- Y) chickenpox
- Z) cellulitis

ANSWER: Y) CHICKENPOX

BONUS

13) GENERAL SCIENCE *Short Answer* Sickle Cell anemia, has the advantage of allowing a person with the disorder to effectively resist what parasitic infectious disease?

ANSWER: MALARIA

TOSS-UP

14) LIFE SCIENCE *Multiple Choice* Which of the following animals are believed to be the closest living relatives to the dinosaurs:

- W) salamanders
- X) snakes
- Y) ostriches
- Z) crocodiles

ANSWER: Z) CROCODILES

BONUS

14) LIFE SCIENCE *Short Answer* Order the following 4 taxonomical groups from the one with the MOST organisms to the LEAST: order; family; phylum; kingdom

ANSWER: KINGDOM; PHYLUM; ORDER; FAMILY

TOSS-UP

15) PHYSICAL SCIENCE *Multiple Choice* The behavior of light has lead scientists to generally consider light as behaving as:

- W) a particle only
- X) a wave only
- Y) the most basic energy source
- Z) particles and waves

ANSWER: Z) PARTICLES AND WAVES

BONUS

15) PHYSICAL SCIENCE *Multiple Choice* Which of the following BEST explains why the halogens are found in nature as compounds or ions:

- W) they have an excess of neutrons and are unstable in pure form
- X) they have 1 electron in their outer shell
- Y) they need only one electron to fill their outermost shell so they are highly reactive
- Z) they are non-metals with unfilled energy shells

ANSWER: Y) THEY NEED ONLY ONE ELECTRON TO FILL THEIR OUTERMOST SHELL SO THEY ARE HIGHLY REACTIVE

TOSS-UP

16) GENERAL SCIENCE *Short Answer* Name all of the following 3 substances that are considered by scientists as antiseptics: 5% bleach; 70% ethanol; tincture of iodine

ANSWER: 70% ETHANOL; TINCTURE OF IODINE

(Solution: antiseptics (for treatment of tissue...typically skin) are differentiated from disinfectants...bleach is a disinfectant)

BONUS

16) GENERAL SCIENCE *Multiple Choice* Which of the following foods contains the MOST grams of carbohydrates:

- W) 3 ounces fried beef liver
- X) 1 cup lard
- Y) 1 cup white granulated sugar
- Z) 1, 8-ounce baked potato, with skin

ANSWER: Y) 1 CUP WHITE GRANULATED SUGAR
(Solution: liver ~ 7; lard ~ 0; potato ~ 50; sugar ~ 200 g)

TOSS-UP

17) EARTH SCIENCE *Multiple Choice* Which of the following is NOT true of humidity:

- W) relative humidity is a description of the water vapor content in air
- X) humans feel uncomfortable when the relative humidity is high because cooling from sweating is less effective
- Y) dew points normally occur when the relative humidity of an air mass is 100%
- Z) the dew point is measured in percent along with the relative humidity

ANSWER: Z) THE DEW POINT IS MEASURED IN PERCENT ALONG WITH THE RELATIVE HUMIDITY

BONUS

17) EARTH SCIENCE *Short Answer* At 30°C a parcel of air can contain 30 grams of water vapor per cubic meter of air. What is the relative humidity if the parcel actually contains 9 grams of water vapor per cubic meter at this temperature?

ANSWER: 30

(Solution: $9/30 \times 100 = 30\%$)

TOSS-UP

18) MATH *Short Answer* Simplify the following expression: $\frac{(15x + 5y)}{15}$

ANSWER: $x + \frac{y}{3}$ (ACCEPT: $x + \frac{1}{3}y$)

BONUS

18) MATH *Short Answer* Simplify the following completely: $\frac{(2x^3x^2)}{x^{-3}}$

ANSWER: $2x^8$

TOSS-UP

19) LIFE SCIENCE *Multiple Choice* In which of the following environments would a thermophilic bacteria most likely evolve:

- W) Antarctic
- X) hot spring
- Y) desert
- Z) thermokarst

ANSWER: X) HOT SPRING

BONUS

19) LIFE SCIENCE *Short Answer* Name all of the following 4 plants that are gymnosperms: fern; ginkgo tree; pine tree; giant sequoia tree

ANSWER: GINKGO TREE; PINE TREE; GIANT SEQUOIA TREE
(ACCEPT: ALL BUT FERN)

TOSS-UP

20) PHYSICAL SCIENCE *Multiple Choice* Which of the following is NOT a hazard that would be listed on the Material Safety Data Sheet for concentrated sulfuric acid:

- W) corrosive
- X) poison
- Y) use with adequate ventilation
- Z) flammable

ANSWER: Z) FLAMMABLE

BONUS

20) PHYSICAL SCIENCE *Short Answer* How many grams are in 10 moles of water if the atomic mass of oxygen is 16 and hydrogen is 1?

ANSWER: 180

(Solution: $18\text{g/mole} \times 10 \text{ moles} = 180 \text{ grams}$)

TOSS-UP

21) GENERAL SCIENCE *Short Answer* Giving your answer in degrees, what is the declination for the north celestial pole?

ANSWER: 90 (ACCEPT: +90) (DO NOT ACCEPT: NEGATIVE or MINUS 90)

BONUS

21) GENERAL SCIENCE *Short Answer* If right ascension is measured in hours, with 24 hours in a full circle, how many degrees of arc are in 1 hour of right ascension?

ANSWER: 15

TOSS-UP

22) EARTH SCIENCE *Short Answer* Which of the following 4 choices does NOT belong with the others: sleet; anvil cloud; hail; lightning

ANSWER: SLEET

BONUS

22) EARTH SCIENCE *Short Answer* Name all of the following 3 choices that are excellent index fossils because they were distributed over a wide geographical area but only for a relatively short period of time: trilobites; ammonites; copepods

ANSWER: TRILOBITES; AMMONITES

TOSS-UP

23) MATH *Short Answer* Multiply the following 2 radicals, giving your answer as a whole number:

$$(4\sqrt{5})(2\sqrt{5})$$

ANSWER: 40

BONUS

23) MATH *Short Answer* Arrange the following 4 choices in INCREASING order:

$$\frac{1}{\sqrt{0.2}}; 0.2^2; 0.2^3; \frac{1}{0.2}$$

ANSWER: 0.2^3 ; 0.2^2 ; $\frac{1}{\sqrt{0.2}}$; $\frac{1}{0.2}$

TOSS-UP

24) LIFE SCIENCE *Short Answer* Of the 3 basic types of muscle in humans, which are considered voluntary?

ANSWER: SKELETAL

BONUS

24) LIFE SCIENCE *Short Answer* At the beginning of metaphase in mitosis, how many chromatids are in each chromosome?

ANSWER: 2

TOSS-UP

25) PHYSICAL SCIENCE *Short Answer* If the distance between 2 objects is doubled and everything else remained the same, by what factor would the gravitational attraction between the two bodies decrease?

ANSWER: 4

BONUS

25) PHYSICAL SCIENCE *Short Answer* If a 4.0-kilogram bowling ball is resting on a shelf 3.0 meters above a floor, how many joules of gravitational potential energy, rounded to the first decimal place, does the ball have relative to the floor, assuming g is 9.8 meters per second squared?

ANSWER: 117.6

(Solution: $PE = 4 \times 9.8 \times 3 \text{ m} = 117.6 \text{ J}$)