

ROUND 4

TOSS-UP

1) MATH *Multiple Choice* Which of the following BEST describes the number property used in the following equation: $(3 \times 2) \times 5 = 3 \times (2 \times 5)$

- W) associative property of multiplication
- X) commutative property of multiplication
- Y) distributive property of multiplication
- Z) multiplicative property of one

ANSWER: W) ASSOCIATIVE PROPERTY OF MULTIPLICATION

BONUS

1) MATH *Short Answer* Arrange the following in increasing order: $(-3)^2$; $-(4)^2$; $(-1)^4$; $-(-3)^3$

ANSWER: $-(4)^2$; $(-1)^4$; $(-3)^2$; $-(-3)^3$

TOSS-UP

2) GENERAL SCIENCE *Short Answer* To the nearest whole number, convert 53°C into kelvin:

ANSWER: 326

BONUS

2) GENERAL SCIENCE *Short Answer* To the nearest whole number, convert 60°C into degrees Fahrenheit:

ANSWER: 140

(Solution: $60 \times 1.8 + 32 = 140^\circ$)

TOSS-UP

3) LIFE SCIENCE *Multiple Choice* Which of the following is NOT a rodent:

- W) rabbit
- X) chipmunk
- Y) prairie dog
- Z) squirrel

ANSWER: W) RABBIT

BONUS

3) LIFE SCIENCE *Short Answer* Order the following 4 groups from the LARGEST taxonomical group to the SMALLEST taxonomical group: family; class; order; phylum

ANSWER: PHYLUM; CLASS; ORDER; FAMILY

TOSS-UP

4) PHYSICAL SCIENCE *Multiple Choice* In a modern optimally functioning internal combustion engine, most of the energy is lost as:

- W) heat
- X) unburnt fuel
- Y) CO₂
- Z) carbon monoxide

ANSWER: W) HEAT

BONUS

4) PHYSICAL SCIENCE *Multiple Choice* Which of the following statements is LEAST accurate regarding states of matter:

- W) solids when heated typically expand
- X) gases can be made of a single element
- Y) matter on Earth is never in a plasma state
- Z) gases condense to form liquids

ANSWER: Y) MATTER ON EARTH IS NEVER IN A PLASMA STATE

TOSS-UP

5) EARTH SCIENCE *Short Answer* At its maximum brightness, which planet of our solar system appears brighter than any other planet in the sky?

ANSWER: VENUS

BONUS

5) EARTH SCIENCE *Multiple Choice* In which of the following locations are you MOST likely to find a well-preserved dinosaur fossil:

- W) within key beds of the Devonian Period
- X) within metamorphic rocks of the Cretaceous Period
- Y) within sedimentary rocks laid down during the Mesozoic Era
- Z) within volcanic casts of the Jurassic Period

ANSWER: Y) WITHIN SEDIMENTARY ROCKS LAID DOWN DURING THE MESOZOIC ERA

TOSS-UP

6) MATH *Short Answer* Giving your answer as a proper fraction in its simplest form, multiply the following two fractions: $(-\frac{5}{6}) \times (-\frac{6}{11})$

ANSWER: $\frac{5}{11}$

BONUS

6) MATH *Short Answer* Giving your answer as a mixed fraction reduced to its lowest terms, subtract the following fractions: $(\frac{8}{9} - \frac{1}{9}) - (\frac{5}{9} - \frac{12}{9})$

ANSWER: $1\frac{5}{9}$

TOSS-UP

7) GENERAL SCIENCE *Multiple Choice* Which of the following is NOT true of metric volumes:

- W) a liter is larger than a centiliter
- X) a milliliter is smaller than a picoliter
- Y) a deciliter is smaller than a liter
- Z) a microliter is smaller than a milliliter

ANSWER: X) A MILLILITER IS SMALLER THAN A PICOLITER

BONUS

7) GENERAL SCIENCE *Short Answer* Giving your answer in proper scientific notation with the correct number of significant digits, convert 800 kilometers per hour into meters per hour:

ANSWER: 8×10^5

TOSS-UP

8) LIFE SCIENCE *Short Answer* Name all of the following 4 organisms that molt:
nematode; clam; lobster; mollusk

ANSWER: LOBSTER

BONUS

8) LIFE SCIENCE *Short Answer* What is the scientific term for the type of circulatory system found in lobsters in which blood empties into spaces in the body that are not contained in vessels?

ANSWER: OPEN

TOSS-UP

9) PHYSICAL SCIENCE *Multiple Choice* Which of the following is a Group 1 metal that gives off a persistent yellow color when burned in a flame test, and is also used in commercial and highway vapor lamps that have a yellow glow:

- W) neon
- X) potassium
- Y) sodium
- Z) zinc

ANSWER: Y) SODIUM

BONUS

9) PHYSICAL SCIENCE *Short Answer* Consider an atom that has an original atomic mass of 33 and has 17 neutrons. If it then loses one proton, what is the resultant atomic number of the atom?

ANSWER: 15

(Solution: atomic mass – 17 N = 16 protons = atomic # of 16 → loss of 1 is 16 – 1 = 15)

TOSS-UP

10) EARTH SCIENCE *Multiple Choice* A psychrometer (read as: sigh-KROM-meter) is used to measure:

- W) salinity
- X) humidity
- Y) wind direction
- Z) pressure

ANSWER: X) HUMIDITY

BONUS

10) EARTH SCIENCE *Short Answer* What is the most common scientific name of the instrument used to measure wind speed?

ANSWER: ANEMOMETER

TOSS-UP

11) MATH *Short Answer* If the mileage scale on a road map is 1 centimeter per 2.5 miles, an 80-mile trip would be represented by how many centimeters on the same map?

ANSWER: 32

BONUS

11) MATH *Short Answer* Of the following five quantities, which is the LEAST and which is the GREATEST, respectively: : 0.425; $\frac{1}{4}$; $\sqrt{2}$; $-\sqrt{9}$; $\frac{4}{3}$

ANSWER: LEAST = $-\sqrt{9}$; GREATEST = $\sqrt{2}$

TOSS-UP

12) GENERAL SCIENCE *Multiple Choice* A dog has a difficult time locating a stick at the bottom of a clear, shallow pool because he perceives it to be in a slightly different spot. This is BEST explained by which of the following properties of light:

- W) diffraction
- X) reflection
- Y) refraction
- Z) polarization

ANSWER: Y) REFRACTION

BONUS

12) GENERAL SCIENCE *Multiple Choice* Which of the following typically accounts for the greatest amount of magnification in a compound light microscope:

- W) condenser lens
- X) objective lens
- Y) ocular lens
- Z) diaphragm

ANSWER: X) OBJECTIVE LENS

TOSS-UP

13) LIFE SCIENCE *Short Answer* What is the most common simple sugar or monosaccharide that makes up most of the carbohydrates of the typical American's diet?

ANSWER: GLUCOSE

BONUS

13) PHYSICAL SCIENCE *Short Answer* Which one of the following 5 molecules is a disaccharide that is present in high levels in milk: maltose; fructose; glucose; lactose; hexose

ANSWER: LACTOSE

TOSS-UP

14) PHYSICAL SCIENCE *Multiple Choice* Which of the following choices is NOT an example of a chemical change:

- W) shiny new copper tarnishing to a green color
- X) bubbles forming in a solution of vinegar following the addition of baking soda
- Y) steel turning red upon heating
- Z) iron rusting

ANSWER: Y) STEEL TURNING RED UPON HEATING

BONUS

14) PHYSICAL SCIENCE *Short Answer* Rusting of iron is a chemical combination of what two chemical elements?

ANSWER: OXYGEN AND IRON

TOSS-UP

15) EARTH SCIENCE *Short Answer* What is the name for the gas found primarily in the stratosphere that absorbs UV radiation and ultimately protects life on Earth?

ANSWER: OZONE

BONUS

15) EARTH SCIENCE *Multiple Choice* Which of the following is immediately released when an earthquake occurs:

- W) convection currents within the mantle
- X) radiation energy originating from the mantle
- Y) stored heat energy from the Sun
- Z) elastic energy stored in rocks

ANSWER: Z) ELASTIC ENERGY STORED IN ROCKS

TOSS-UP

16) MATH *Short Answer* If a fair die is tossed once, what is the probability that an odd number or a number less than 3 is thrown expressed as a fraction in lowest terms?

ANSWER: $\frac{2}{3}$

BONUS

16) MATH *Short Answer* If the time is 1:15 PM, what time will it be, given as hours, minutes and AM or PM, in 630 minutes?

ANSWER: 11:45 PM

TOSS-UP

17) GENERAL SCIENCE *Multiple Choice* Which of the following gases was most likely LEAST abundant in Earth's early atmosphere:

- W) carbon dioxide
- X) ammonia
- Y) water
- Z) oxygen

ANSWER: Z) OXYGEN

BONUS

17) GENERAL SCIENCE *Short Answer* Arrange the following 4 organisms from the first to appear on Earth to the most recent to appear on Earth: fish; invertebrates; reptiles; mammals

ANSWER: INVERTEBRATES; FISH; REPTILES; MAMMALS

TOSS-UP

18) LIFE SCIENCE *Short Answer* What type of nucleic acid has codons for matching with anticodons?

ANSWER: MESSENGER RNA (ACCEPT: mRNA)

BONUS

18) LIFE SCIENCE *Short Answer* How many nucleotide bases make up an anticodon?

ANSWER: 3

TOSS-UP

19) PHYSICAL SCIENCE *Short Answer* What are the most common SI units used for the acceleration of an object?

ANSWER: METERS PER SECOND SQUARED

BONUS

19) PHYSICAL SCIENCE *Short Answer* Neglecting friction, what is the acceleration, in meters per second squared, of a 20-kilogram iron block across a horizontal surface if 700 newtons is applied to the block?

ANSWER: 35

(Solution: $A = F/M$; $A = 700/20$; $A = 35 \text{ m/sec}^2$)

TOSS-UP

20) EARTH SCIENCE *Multiple Choice* Which of the following is NOT true about Earth's water:

- W) the Antarctic ice sheet holds most of the world's fresh water
- X) an estuary is a place where a fresh water river is mixed with ocean water
- Y) rivers and lakes make up less than 1% of all fresh water
- Z) the global ocean conveyor system is powered mostly by surface winds

ANSWER: Z) THE GLOBAL OCEAN CONVEYOR SYSTEM IS POWERED MOSTLY BY SURFACE WINDS

BONUS

20) EARTH SCIENCE *Short Answer* What is the name for the layer of the Earth that is nearly 1,800 miles thick and represents about 68% of the Earth's mass?

ANSWER: MANTLE

TOSS-UP

21) MATH *Short Answer* If side A of a right triangle measures 4 meters and the hypotenuse measures 5 meters, what is the length of side B, in meters?

ANSWER: 3

(Solution: 3:4:5 triangle)

BONUS

21) MATH *Short Answer* What is the area of a square, in square meters, if its perimeter is 28 meters?

ANSWER: 49

TOSS-UP

22) GENERAL SCIENCE *Short Answer* What gaseous molecule is produced from the burning of fossil fuels and is believed to be the primary cause of the greenhouse warming effect on Earth?

ANSWER: CARBON DIOXIDE (ACCEPT: CO₂)

BONUS

22) GENERAL SCIENCE *Multiple Choice* Which of the following is NOT typically considered an alternative energy source:

- W) hot springs
- X) natural gas
- Y) wind energy
- Z) sun energy

ANSWER: X) NATURAL GAS

TOSS-UP

23) LIFE SCIENCE *Short Answer* What is the most common term for the arrangement of veins in the leaves of most monocots?

ANSWER: PARALLEL

BONUS

23) LIFE SCIENCE *Short Answer* How many cotyledons are found in seedlings of plants that develop into adult plants with parallel veins in their leaves and flower parts usually in multiples of three?

ANSWER: 1

TOSS-UP

24) PHYSICAL SCIENCE *Short Answer* Solutions with a pH less than about 6 typically have what distinctive taste?

ANSWER: SOUR

BONUS

24) PHYSICAL SCIENCE *Short Answer* What is the SI the unit for frequency?

ANSWER: HERTZ

TOSS-UP

25) EARTH SCIENCE *Multiple Choice* Which of the following is NOT directly or indirectly a result of a large earthquake:

- W) fires
- X) tsunami
- Y) mass wasting
- Z) lightning

ANSWER: Z) LIGHTNING

BONUS

25) EARTH SCIENCE *Multiple Choice* The area known as the 'ring of fire' is prone to intense earthquake and volcanic activity because this is where:

- W) the oceanic crust is the thinnest
- X) the oceanic crust is the densest
- Y) density differences between the lithosphere and the mantle are most pronounced
- Z) most convergent plate boundaries are found

ANSWER: Z) MOST CONVERGENT PLATE BOUNDARIES ARE FOUND