

**ROUND 15**

**TOSS-UP**

1) GENERAL SCIENCE *Multiple Choice* Which of the following is TRUE:

- W) all yeasts are nonpathogenic in humans
- X) all humans have the same number of chromosomes
- Y) all bats carry rabies
- Z) all DNA contains phosphorous

ANSWER: Z) ALL DNA CONTAINS PHOSPHOROUS

**BONUS**

1) GENERAL SCIENCE *Short Answer* To anneal a metal, what do you generally treat it with?

ANSWER: HEAT (ACCEPT: HIGH TEMPERATURES)

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**TOSS-UP**

2) LIFE SCIENCE *Multiple Choice* Lipids will dissolve best in which of the following:

- W) 3% salt water
- X) milk
- Y) distilled water
- Z) chloroform

ANSWER: Z) CHLOROFORM

**BONUS**

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

- W) all living things require energy except in some states of dormancy
- X) energy is transformed from one state to another in living things
- Y) the laws of thermodynamics do not apply to living things
- Z) enzymes allow certain reactions to occur at faster rates than without them

ANSWER: Y) THE LAWS OF THERMODYNAMICS DO NOT APPLY TO LIVING THINGS

**TOSS-UP**

3) GENERAL SCIENCE *Multiple Choice* Which of the following is NOT true of glycerol:

- W) it has 3 carbons
- X) it is sometimes used as a sweetener in human foods
- Y) it has no caloric value in humans
- Z) it is considered a sugar alcohol

ANSWER: Y) IT HAS NO CALORIC VALUE IN HUMANS

**BONUS**

3) GENERAL SCIENCE *Multiple Choice* Which of the following stars typically has the GREATEST density:

- W) black dwarf
- X) neutron star
- Y) Main Sequence star
- Z) Blue Giant

ANSWER: X) NEUTRON STAR

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**TOSS-UP**

4) EARTH SCIENCE *Multiple Choice* Which of the following coasts in North America contains the most pronounced fjords:

- W) the west coast from Puget Sound to Alaska
- X) the west coast from Oregon to Mexico
- Y) the east coast from Maine to Florida
- Z) the entire Gulf Coast

ANSWER: W) THE WEST COAST FROM PUGET SOUND TO ALASKA

**BONUS**

4) EARTH SCIENCE *Short Answer* What is the specific name for accumulated snow or ice that survives one melt season on a glacier?

ANSWER: FIRN

**TOSS-UP**

5) PHYSICAL SCIENCE *Multiple Choice* Which of the following most closely relates to the first law of thermodynamics:

- W) conservation of energy
- X) transformation of mass into energy
- Y) energy moving from a cold to a hot object
- Z) kinetic energy of molecules and atoms

ANSWER: W) CONSERVATION OF ENERGY

**BONUS**

5) PHYSICAL SCIENCE *Short Answer* The specific heat of water is about 10-times that of copper. By words or numbers, name all of the following 3 statements that are TRUE:

- 1) 1 gram of water requires more energy than 1 gram of copper to raise its temperature by 1°C
- 2) water will cool down in the same environment much faster than a sample of copper of the same mass
- 3) 1 gram of water has 10-times as much average translational kinetic energy than 1 gram of copper at the same temperature

ANSWER: 1

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**TOSS-UP**

6) MATH *Multiple Choice* The graph of the equation,  $\frac{x}{2} + \frac{y}{4} = 1$ , is a:

- W) straight line
- X) parabola
- Y) ellipse
- Z) circle

ANSWER: W) STRAIGHT LINE

(Solution:  $y = -2x + 4$ )

**BONUS**

6) MATH *Short Answer* A hardware store-owner buys a 100-pound box of nails for \$200. If the owner repackages the nails into 2-pound bags and sells them each for \$6.00 per bag, find his profit in dollars after selling all the nails:

ANSWER: 100

(Solution:  $50 \text{ bags} \times \$6 = \$300$ ;  $300 - 200 = \$100$ )

**TOSS-UP**

7) LIFE SCIENCE *Multiple Choice* During which of the following embryonic stages of a human are all 3 germ layers formed:

- W) zygote
- X) blastula
- Y) gastrula
- Z) morula

ANSWER: Y) GASTRULA

**BONUS**

7) LIFE SCIENCE *Multiple Choice* Which of the following do all chordates possess at some time in their lives:

- W) gill slits
- X) radula
- Y) book lungs
- Z) exoskeleton

ANSWER: W) GILL SLITS

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**TOSS-UP**

8) GENERAL SCIENCE *Multiple Choice* Which of the following sound frequencies would generally NOT be heard by humans:

- W) 20 hertz
- X) 200 hertz
- Y) 2 kilohertz
- Z) 20 kilohertz

ANSWER: Z) 20 KILOHERTZ

**BONUS**

8) GENERAL SCIENCE *Multiple Choice* Which of the following is the greatest contributor to ambient carbon monoxide concentrations in the U.S.:

- W) industrial processes
- X) electric utilities
- Y) transportation
- Z) farm animals

ANSWER: Y) TRANSPORTATION

### TOSS-UP

9) EARTH SCIENCE *Multiple Choice* Which of the following is NOT true about earthquakes:

- W) the focus of an earthquake is the point from which energy is released
- X) the epicenter is the point on Earth's surface directly above the focus
- Y) lithospheric plate interactions commonly cause both earthquakes and volcanoes
- Z) primary seismic waves cause the most damage to buildings during an earthquake

ANSWER: Z) PRIMARY SEISMIC WAVES CAUSE THE MOST DAMAGE TO BUILDINGS DURING AN EARTHQUAKE

### BONUS

9) EARTH SCIENCE *Short Answer* Arrange the following 3 types of seismic waves from the FIRST to arrive at a seismic recording station to the LAST from a given earthquake:

S-wave; L-wave; P-wave

ANSWER: P-WAVE; S-WAVE; L-WAVE

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### TOSS-UP

10) PHYSICAL SCIENCE *Multiple Choice* Distillation will NOT work very well under which of the following situations:

- W) the components in the mixture have the same boiling points
- X) the mixture consists of a solid and a liquid
- Y) the mixture is colored
- Z) the mixture is not colored

ANSWER: W) THE COMPONENTS IN THE MIXTURE HAVE THE SAME BOILING POINTS

### BONUS

10) PHYSICAL SCIENCE *Multiple Choice* Acetylene has a triple bond between its two carbons. Which of the following shapes does it have:

- W) bent
- X) tetrahedral
- Y) linear
- Z) see-saw

ANSWER: Y) LINEAR

**TOSS-UP**

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

- W)  $\pi$  is an irrational number
- X) a dodecahedron has 12 faces
- Y) 5 factorial is 5-times as large as 4 factorial
- Z) if  $n$  is a multiple of 2, then  $n + 1$  is also a multiple of 2

ANSWER: Z) IF  $N$  IS A MULTIPLE OF 2, THEN  $N + 1$  IS ALSO A MULTIPLE OF 2

**BONUS**

11) MATH *Short Answer* Ebony has taken 5 math tests and averaged 90% on her first 2 tests but averaged 100% on the next 3 tests. What is her overall percent average after these 5 tests, assuming all are weighted equally?

ANSWER: 96

(Solution:  $[3(100\%) + 2(90\%)]/5 = 96\%$ )

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**TOSS-UP**

12) LIFE SCIENCE *Short Answer* In certain diseases, red blood cells are damaged and destroyed in massive numbers. What organ will often enlarge under these circumstances and be central in the removal of the abnormal red blood cells and their breakdown products?

ANSWER: SPLEEN

**BONUS**

12) LIFE SCIENCE *Short Answer* Name all of the following 4 molecules that serve as neurotransmitters in vertebrates: adrenaline; dopamine; serotonin; sphingosine (read as: SFING-go-seen)

ANSWER: ADRENALINE; DOPAMINE; SEROTONIN  
(ACCEPT: ALL BUT SPHINGOSINE)

**TOSS-UP**

13) GENERAL SCIENCE *Short Answer* Instead of lenses, what do refractor telescope use to collect light from celestial objects?

ANSWER: MIRRORS

**BONUS**

13) GENERAL SCIENCE *Short Answer* What is the most common term for the final stage of a star with between 1 and 3 solar masses?

ANSWER: WHITE DWARF (ACCEPT: BLACK DWARF)

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**TOSS-UP**

14) EARTH SCIENCE *Multiple Choice* Which of the following is NOT true about the Appalachian Mountain Range:

- W) it is older than the Himalayan range
- X) it has no active volcanoes
- Y) the southeastern portion is undergoing accelerated mountain building
- Z) it occurs along an ancient plate boundary

ANSWER: Y) THE SOUTHEASTERN PORTION IS UNDERGOING ACCELERATED MOUNTAIN BUILDING

**BONUS**

14) EARTH SCIENCE *Multiple Choice* Which of the following is the name for the mineral with the chemical composition  $\text{Fe}_3\text{O}_4$ :

- W) magnetite
- X) pyrite
- Y) olivine
- Z) biotite mica

ANSWER: W) MAGNETITE

**TOSS-UP**

15) PHYSICAL SCIENCE *Multiple Choice* Which of the following is TRUE:

- W) unlike charges repel
- X) lithium is an alkaline earth metal
- Y) magnetic poles always come in pairs
- Z) some isotopes of helium have 1 proton

ANSWER: Y) MAGNETIC POLES ALWAYS COME IN PAIRS

**BONUS**

15) PHYSICAL SCIENCE *Short Answer* Consider a catapult on a cliff 20 meters above the ground directly below. If air resistance is ignored, how many seconds, rounded to the nearest whole second, will it take a rock launched horizontally from the catapult at 25 meters per second to hit the ground?

ANSWER: 2

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**TOSS-UP**

16) MATH *Short Answer* A carpenter is building a vertical wall and using one, 2-by-4 vertical stud every 16 inches. If the wall is 8 feet long, how many vertical studs will he use?

ANSWER: 7

**BONUS**

16) MATH *Short Answer* A circle has a circumference of  $80\pi$ . Giving your answer in terms of  $\pi$ , find the length of a  $36^\circ$  arc of this circle:

ANSWER:  $8\pi$

(Solution:  $C = 80\pi$ ;  $36^\circ/360^\circ = 1/10 \times 80\pi = 8\pi$ )

**TOSS-UP**

17) LIFE SCIENCE *Short Answer* What is the most common term used to describe a hydrocarbon chain that has all single bonds between carbons?

ANSWER: SATURATED

**BONUS**

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

- W) synapsis of chromosomes
- X) chromosomes line up at metaphase
- Y) nuclear membrane dissolves
- Z) sister chromatids separate

ANSWER: W) SYNAPSIS OF CHROMOSOMES

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**TOSS-UP**

18) GENERAL SCIENCE *Multiple Choice* Which of the following does one arcsecond equal:

- W) 60 arcminutes
- X) 60 arcs
- Y)  $1/60^{\text{th}}$  of an arcminute
- Z)  $1/360^{\text{th}}$  of an arcminute

ANSWER: Y)  $1/60^{\text{TH}}$  OF AN ARCMINUTE

**BONUS**

18) GENERAL SCIENCE *Multiple Choice* If a superior planet is at opposition, it can be seen:

- W) only at sunset
- X) just before sunrise
- Y) throughout the night
- Z) not at all

ANSWER: Y) THROUGHOUT THE NIGHT

### TOSS-UP

19) EARTH SCIENCE *Multiple Choice* The MOST catastrophic mass extinction event in Earth's history occurred about how many million years ago:

- W) 65
- X) 250
- Y) 2,800
- Z) 4,800

ANSWER: X) 250

### BONUS

19) EARTH SCIENCE *Short Answer* What is the name for the largest extinction event when nearly all life on Earth came to an end?

ANSWER: PERMIAN EXTINCTION (ACCEPT: PERMIAN or PERMIAN-TRIASSIC or PERMO-TRIASSIC)

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### TOSS-UP

20) PHYSICAL SCIENCE *Multiple Choice* Which of the following best describes the following reaction:  $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

- W) combination
- X) decomposition
- Y) single replacement
- Z) combustion

ANSWER: W) COMBINATION

### BONUS

20) PHYSICAL SCIENCE *Short Answer* Name all of the following 3 substances that will likely form a weak electrolyte when dissolved in pure water:  
acetic acid; magnesium chloride; sodium hydroxide

ANSWER: ACETIC ACID

**TOSS-UP**

21) MATH *Short Answer* Choosing from  $x$ -coordinate,  $y$ -coordinate, slope and height, what value of the graph of a linear function is always constant?

ANSWER: SLOPE

**BONUS**

21) MATH *Short Answer* What is the exact value of the  $\log_{10} 10^{20}$ ? (read as: log base 10, of 10 to the 20<sup>th</sup> power)

ANSWER: 20

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**TOSS-UP**

22) LIFE SCIENCE *Short Answer* If a normal human lymphocyte underwent mitosis but NOT cytokinesis, how many chromosomes would the cell have?

ANSWER: 92

**BONUS**

22) LIFE SCIENCE *Short Answer* The structure of proteins is classified from primary through quaternary levels. Which level is determined by the sequence of its amino acids?

ANSWER: PRIMARY

**TOSS-UP**

23) PHYSICAL SCIENCE *Short Answer* Name all of the following 4 choices that are organic acids: citric acid; hydrochloric acid; nitric acid; hydrogen sulfide

ANSWER: CITRIC ACID

**BONUS**

23) PHYSICAL SCIENCE *Short Answer* Name all of the following 3 physical properties of a block of iron that change when the temperature of an object is raised: electrical conductance; volume; density

ANSWER: ALL

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**TOSS-UP**

24) EARTH SCIENCE *Short Answer* The smelting of pure iron ore is done to remove what atoms which are bonded to the iron atom?

ANSWER: OXYGEN

**BONUS**

24) EARTH SCIENCE *Short Answer* Also known as Arctic sea smoke, what is the meteorological term for what often forms over open water in frigid temperatures as a result of vapor condensation?

ANSWER: FOG (ACCEPT: ARCTIC FOG)

**TOSS-UP**

25) MATH *Short Answer* What is the name for any line in the same plane as a circle and intersecting the circle at exactly one point?

ANSWER: TANGENT

**BONUS**

25) MATH *Short Answer* Solve the following equation for  $x$ :  $256 = 2^{(x+1)}$

ANSWER: 7