## ROUND 8

### TOSS-UP

1) EARTH SCIENCE *Multiple Choice* Which of the following is NOT generally characteristic of oceanic-continental plate boundaries:

W) high mountain systems
X) wide continental shelves
Y) ocean trenches
Z) earthquake prone areas

ANSWER: X) WIDE CONTINENTAL SHELVES

### BONUS

1) EARTH SCIENCE *Multiple Choice* Which of the following is an example of an island arc collision zone:

W) Japan
X) Oregon
Y) Maine
Z) Chile and Peru

ANSWER: W) JAPAN

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### TOSS-UP

2) MATH *Short Answer* In what quadrant of the coordinate system are both $x$ and $y$ negative?

ANSWER: 3 (ACCEPT: III or THIRD)

### BONUS

2) MATH *Short Answer* Bottled water is selling for 60-cents per bottle. If you buy a dozen bottles and hand the cashier a ten-dollar bill, how much change are your owed, in dollars and cents?

ANSWER: $2.80

**TOSS-UP**

3) GENERAL SCIENCE *Multiple Choice* Which of the following is CLOSEST to the volume of 4 liters in quarts:

W) 3.8
X) 4.0
Y) 4.2
Z) 4.4

ANSWER: Y) 4.2

(Solution: 1 L = 1.06 q; 4 L = 4.24 q)

**BONUS**

3) GENERAL SCIENCE *Short Answer* Arrange the following 3 choices in order of INCREASING mass: largest moon of Saturn; Brown dwarf star; Earth

ANSWER: LARGEST MOON OF SATURN; EARTH; BROWN DWARF STAR

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**TOSS-UP**

4) LIFE SCIENCE *Multiple Choice* Which of the following terms do biologists most often use to describe animals that do not move by their own design or effort:

W) saprophytic
X) instar
Y) motile
Z) sessile

ANSWER: Z) SESSILE

**BONUS**

4) LIFE SCIENCE *Short Answer* What is the base nucleotide to which adenine binds on its opposing strand in DNA?

ANSWER: THYMINE

**TOSS-UP**

5) PHYSICAL SCIENCE *Short Answer* Light typically travels in waves that are oriented in all planes traveling in a given direction. What is the term for light waves that are traveling in one plane?

ANSWER: POLARIZED (ACCEPT: LINEAR POLARIZED)

**BONUS**

5) PHYSICAL SCIENCE *Short Answer* Name all of the following 4 choices that are electromagnetic radiation: radio waves; x-rays; cathode rays; visible light

ANSWER: ALL

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**TOSS-UP**

6) EARTH SCIENCE *Short Answer* Name all the planets that appear to have phases like our Moon to Earthbound observers?

ANSWER: MERCURY; VENUS

**BONUS**

6) EARTH SCIENCE *Multiple Choice* The greatest annual variation in the intensity of solar radiation on Earth throughout the year is in which of the following locations:

W) tropics
X) north of the Arctic Circle
Y) south of the Antarctic Circle
Z) temperate, middle latitude zone

ANSWER: Z) TEMPERATE, MIDDLE LATITUDE ZONE

**TOSS-UP**

7) MATH *Multiple Choice* Pick any arbitrary point in the interior of a circle 12-inches in diameter and cut the circle into 8 slices by cutting at 45º angles through that arbitrary point. If you color alternate pieces blue and yellow, then the total area of the blue slices will:

W) equal the area of the yellow slices
X) be twice the area of the yellow slices
Y) be one-half the area of the yellow slices
Z) be one-third the area of the yellow slices

ANSWER: W) EQUAL THE AREA OF THE YELLOW SLICES

**BONUS**

7) MATH *Short Answer* Consider the four angles formed by two intersecting lines. If one angle measures 50º, find the measure of the remaining three angles, in degrees:

ANSWER: 50; 130; 130

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**TOSS-UP**

8) GENERAL SCIENCE *Multiple Choice* Which of the following is NOT a property of diamonds:

W) extremely hard
X) transparent
Y) poor thermal conductor
Z) good electrical insulator

ANSWER: Y) POOR THERMAL CONDUCTOR

**BONUS**

8) GENERAL SCIENCE *Short Answer* Give the Roman numeral equivalent of 2009:

ANSWER: MMIX (DO NOT ACCEPT: MMVIIII)

**TOSS-UP**

9) LIFE SCIENCE *Short Answer* What anatomical structure in boney fish allows them to adjust their buoyancy and stay afloat without swimming?

ANSWER: SWIMBLADDER (ACCEPT: AIR BLADDER or GAS BLADDER)

**BONUS**

9) LIFE SCIENCE *Short Answer* What is the most common name for the fluid in a spider that serves a similar function to blood in vertebrates?

ANSWER: HAEMOLYMPH (ACCEPT: HEMOLYMPH)

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**TOSS-UP**

10) PHYSICAL SCIENCE *Multiple Choice* In which of the following units would capacitance most likely be given:

W) webers
X) farads
Y) teslas
Z) ohms

ANSWER: X) FARADS

**BONUS**

10) PHYSICAL SCIENCE *Short Answer* Name all of the following 3 choices that are DC voltage sources: 9-volt battery; lightning; static electricity

ANSWER: ALL

**TOSS-UP**

11) EARTH SCIENCE *Multiple Choice* Which of the following best describes how volcanic glass or obsidian is formed:

W) magma cools rapidly and crystals do not form
X) magma cools slowly and 1 large crystal is formed
Y) magma cools in direct contact with water
Z) magma is heated, cooled, then reheated

ANSWER: W) MAGMA COOLS RAPIDLY AND CRYSTALS DO NOT FORM

**BONUS**

11) EARTH SCIENCE *Multiple Choice* The dominant component of most magma is:

W) carbon
X) sulfur dioxide
Y) silicon dioxide
Z) nitrogen

ANSWER: Y) SILICON DIOXIDE

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**TOSS-UP**

12) MATH *Short Answer* Any number, except zero, to the zero power equals what?

ANSWER: 1

**BONUS**

12) MATH *Short Answer* Give the numerical value of 20 factorial divided by 18 factorial:

ANSWER: 380

**TOSS-UP**

13) GENERAL SCIENCE *Short Answer* From what element are most semiconductors primarily composed?

ANSWER: SILICON

**BONUS**

13) GENERAL SCIENCE *Multiple Choice* Which of the following is CLOSEST to 56 miles per hour in kilometers per hour:

W) 20
X) 50
Y) 90
Z) 120

ANSWER: Y) 90

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**TOSS-UP**

14) LIFE SCIENCE *Short Answer* What organelle with attached ribosomes is most directly responsible for the translation of proteins destined to be transported out of the cell?

ANSWER: ENDOPLASMIC RETICULUM
(ACCEPT: ER or RER or ROUGH ER or ROUGH ENDOPLASMIC RETICULUM)
(DO NOT ACCEPT: SER or SMOOTH ER or SMOOTH ENDOPLASMIC RETICULUM)

**BONUS**

14) LIFE SCIENCE *Short Answer* Name all of the following 4 functional groups that are found in all amino acids: carboxyl; ketone; amino; phosphate

ANSWER: CARBOXYL; AMINO

**TOSS-UP**

15) PHYSICAL SCIENCE *Short Answer* What is the resultant force when a force of 50 newtons is opposed in an opposite direction by a 10-newton force?

ANSWER: 40

**BONUS**

15) PHYSICAL SCIENCE *Short Answer* A dog-sled team runs at 15 kilometers per hour for 6 hours and gets stuck in a partially melted lake for 3 hours, where it make no progress. It then runs at 10 kilometers per hour for another 5 hours and crosses the finish line. What is the dog sled team's average speed for the entire race, in kilometers per hour?

ANSWER: 10

(Solution: $(6 \times 15 = 90) + (5 \times 10 = 50) = 140$; $140/14 = 10$ km/hr)

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**TOSS-UP**

16) EARTH SCIENCE *Multiple Choice* Banded iron formations that are present in mountain ranges around the world formed during the Achaean Era as a direct result of the presence of:

W) nitrogen
X) oxygen
Y) hydrogen
Z) methane

ANSWER: X) OXYGEN

**BONUS**

16) EARTH SCIENCE *Multiple Choice* Which of the following is a carbonate mineral:

W) halite
X) fluorite
Y) feldspar
Z) dolomite

ANSWER: Z) DOLOMITE

**TOSS-UP**

17) MATH *Short Answer* How many terms are in the following variable expression and what is the coefficient of the second term: $5x^2 - x - 12yz^2 + 9$

ANSWER: TERMS = 4; COEFFICIENT = –1

**BONUS**

17) MATH *Short Answer* Sue and Sierra are making necklaces. If Sue makes an average of 3 every 30 minutes and Sierra averages 6 every hour, how many necklaces do they average every hour if they work together?

ANSWER: 12

(Solution: 3/0.5 + 6/1 = 12)

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**TOSS-UP**

18) GENERAL SCIENCE *Short Answer* What specific cell in your body becomes sickle-shaped if you are afflicted with sickle cell anemia?

ANSWER: RED BLOOD CELL (ACCEPT: RBC or ERYTHROCYTE or RED CORPUSCLE)

**BONUS**

18) GENERAL SCIENCE *Short Answer* Name all of the following 4 laboratory tools that would require a user to read a meniscus: graduated pipet; pH paper; watch glass; Buchner funnel

ANSWER: GRADUATED PIPET

**TOSS-UP**

19) LIFE SCIENCE *Short Answer* What is the most common name of the plant pigments that give fruits and many plant parts their orange color?

ANSWER: CAROTENOIDS

**BONUS**

19) LIFE SCIENCE *Multiple Choice* Which of the following organisms has an archegonium:

W) moss
X) bird
Y) frog
Z) oak tree

ANSWER: W) MOSS

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**TOSS-UP**

20) PHYSICAL SCIENCE *Short Answer* What is the most commonly used scientific name for the compound with the chemical formula $C_6H_{12}O_6$, which is a product of photosynthesis?

ANSWER: GLUCOSE (ACCEPT: D-GLUCOSE or DEXTROSE)

**BONUS**

20) PHYSICAL SCIENCE *Short Answer* Arrange the following 4 substances in order of DECREASING pH: normal human saliva; black coffee; bleach; stomach acid

ANSWER: BLEACH; NORMAL HUMAN SALIVA; BLACK COFFEE; STOMACH ACID

(Solution: bleach = 13; saliva = 6.5-7.4; coffee = 5; stomach acid = 2)

**TOSS-UP**

21) EARTH SCIENCE *Multiple Choice* Stratovolcanoes are typically found in which of the following locations:

W) continents and volcanic arcs
X) the abyssal plain
Y) along basaltic plateaus
Z) above hot spots in Earth's crust

ANSWER: W) CONTINENTS AND VOLCANIC ARCS

**BONUS**

21) EARTH SCIENCE *Multiple Choice* Which of the following is NOT true of the troposphere:

W) the air is much dryer above the troposphere
X) the troposphere is 78% nitrogen gas and 21% oxygen gas
Y) the troposphere extends from the Earth's surface up to an average of 27 miles
Z) the troposphere ends where temperature no longer varies with height

ANSWER: Y) THE TROPOSPHERE EXTENDS FROM THE EARTH'S SURFACE UP TO AN AVERAGE OF 27 MILES

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**TOSS-UP**

22) MATH *Short Answer* For the equation $y = mx + b$, $b$ represents what value?

ANSWER: *Y*-INTERCEPT (ACCEPT: WHERE THE LINE CROSSES THE *Y* OR ORDINATE AXIS)

**BONUS**

22) MATH *Short Answer* Find a number such that 10-times the number reduced by 3 equals 4-times the number increased by 15:

ANSWER: 3

(Solution: $10x - 3 = 4x + 15$)

**TOSS-UP**

23) GENERAL SCIENCE *Short Answer* From what constellation do the Geminids meteor shower appear to originate?

ANSWER: GEMINI

**BONUS**

23) GENERAL SCIENCE *Multiple Choice* Which of the following astronomers devised a system of the orbits for the planets that is considered heliocentric and published in his book "On the Revolutions of the Heavenly Spheres":

W) Galileo
X) Copernicus
Y) Newton
Z) Kepler

ANSWER: X) COPERNICUS

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**TOSS-UP**

24) LIFE SCIENCE *Short Answer* How many pairs of wings do beetles typically have?

ANSWER: 2

**BONUS**

24) LIFE SCIENCE *Short Answer* How many cervical vertebrae are found in most mammals?

ANSWER: 7

**TOSS-UP**

25) PHYSICAL SCIENCE *Short Answer* How many wavelengths per second are equal to 5 kilohertz?

ANSWER: 5,000

**BONUS**

25) PHYSICAL SCIENCE *Short Answer* What is the percent efficiency for a lever that has a work input of 2,000 joules and a work output of 1,600 joules?

ANSWER: 80

(Solution: %efficiency = Work out/ Work in × 100 → 1600/2000 × 100 = 80%)