1) LIFE SCIENCE  *Multiple Choice*  Which of the following anatomical structures is missing in the hagfish:

W) heart  
X) brain  
Y) notocord  
Z) jaw  

ANSWER: Z) JAW

BONUS

1) LIFE SCIENCE  *Short Answer*  Name all of the following 4 organisms that are echinoderms: squid; snails; starfish; lobsters  

ANSWER: STARFISH

TOSS-UP

2) PHYSICAL SCIENCE  *Multiple Choice*  Which of the following is the most common electronic device used for storing electric energy in a process commonly called charging:

W) capacitor  
X) transformer  
Y) rectifier  
Z) semiconductor  

ANSWER: W) CAPACITOR

BONUS

2) PHYSICAL SCIENCE  *Short Answer*  What modern solid-state electronic device is used as an amplifier in modern radios and, through its wide use as an electronic switch, is a basic component in modern logic circuits?  

ANSWER: TRANSISTOR
TOSS-UP

3) EARTH SCIENCE  Multiple Choice  Giant kelp found in oceans do NOT possess which of the following structures:

W) holdfasts  
X) gas bladders  
Y) stipes  
Z) roots  

ANSWER: Z) ROOTS

BONUS

3) EARTH SCIENCE  Short Answer  What numerical albedo value is given to a surface that reflects 100% of incident light?

ANSWER: 1

TOSS-UP

4) MATH  Multiple Choice  Which of the following is TRUE:

W) every real number has a reciprocal  
X) the product of two integers is always positive  
Y) the quotient times the divisor equals the dividend  
Z) the product of two numbers is greater than either factor

ANSWER: Y) THE QUOTIENT TIMES THE DIVISOR EQUALS THE DIVIDEND

BONUS

4) MATH  Short Answer  Evaluate the following and give your answer as a proper fraction in lowest terms: \[ \frac{3}{16} + \frac{5}{8} - \frac{1}{4} \]

ANSWER: \[ \frac{9}{16} \]
TOSS-UP

5) GENERAL SCIENCE  Multiple Choice  People who are lactose intolerant are unable to digest the sugar present in which of the following:

W) milk
X) wheat
Y) peanuts
Z) eggs

ANSWER: W) MILK

BONUS

5) GENERAL SCIENCE  Short Answer  Arrange the following 3 choices in INCREASING order of distance: 1 mile; 2 kilometers; 1,600 yards

ANSWER: 1,600 YARDS; 1 MILE; 2 KILOMETERS

TOSS-UP

6) LIFE SCIENCE  Short Answer  What is the most common term used for the biological process of converting atmospheric nitrogen into a form readily available for use in organisms?

ANSWER: NITROGEN FIXATION (ACCEPT: FIXATION)

BONUS

6) LIFE SCIENCE  Multiple Choice  Which of the following groups of organisms is most commonly associated with the ability to fix nitrogen:

W) plants
X) animals
Y) plants and animals
Z) bacteria

ANSWER: Z) BACTERIA
TOSS-UP

7) PHYSICAL SCIENCE *Multiple Choice* Which of the following is the inverse of electrical resistance:

W) voltage  
X) conductivity  
Y) amperage  
Z) ohms

ANSWER: X) CONDUCTIVITY

BONUS

7) PHYSICAL SCIENCE *Multiple Choice* Which of the following is the current carrier in a typical electrical conductor:

W) free protons  
X) mobile electrons  
Y) stable atoms  
Z) hydrogen ions

ANSWER: X) MOBILE ELECTRONS

TOSS-UP

8) EARTH SCIENCE *Short Answer* Which 2 of the following 4 choices represent the suspended load of a river that gives a slow-moving river a cloudy appearance: gravel; clay; silt; sand

ANSWER: CLAY; SILT

BONUS

8) EARTH SCIENCE *Multiple Choice* The average depth of the ocean basin floor is:

W) 1,000 to 2,000 meters  
X) 2,000 to 4,000 meters  
Y) 4,000 to 6,000 meters  
Z) 6,000 to 10,000 meters

ANSWER: Y) 4,000 TO 6,000 METERS
TOSS-UP

9) MATH  Short Answer  Solve the formula, \( I = prt \), for \( r \):

\[
\text{ANSWER: } r = \frac{I}{pt} \quad (\text{ACCEPT: } \frac{I}{pt})
\]

BONUS

9) MATH  Short Answer  Multiply the following 3 fractions and give your answer as a proper fraction in simplest terms:

\[
\frac{3}{10} \times \frac{5}{7} \times \frac{1}{2}
\]

\[
\text{ANSWER: } \frac{3}{28}
\]

TOSS-UP

10) GENERAL SCIENCE  Short Answer  Name all of the following 4 choices that are NOT SI units: meter; kilogram; degree Celsius; mole

\[
\text{ANSWER: DEGREE CELSIUS}
\]

BONUS

10) GENERAL SCIENCE  Short Answer  Convert 5 meters per second to kilometers per hour:

\[
\text{ANSWER: 18}
\]
11) LIFE SCIENCE *Multiple Choice* Which of the following is a lipid:

- W) lipase
- X) myoglobin
- Y) trypsin
- Z) corn oil

**ANSWER:** Z) CORN OIL

**BONUS**

11) LIFE SCIENCE *Multiple Choice* Which of the following organisms contains the most chitin (read as: KYE-tin) by percent of body weight:

- W) leopard
- X) ant
- Y) squid
- Z) whale

**ANSWER:** X) ANT

**TOSS-UP**

12) PHYSICAL SCIENCE *Multiple Choice* Nitrogen, sulfur, and selenium are all:

- W) metals
- X) nonmetals
- Y) metalloids
- Z) noble gases

**ANSWER:** X) NONMETALS

**BONUS**

12) PHYSICAL SCIENCE *Short Answer* Name all of the following 3 substances that are allotropes or different chemical forms of carbon: diamond; graphite; topaz

**ANSWER:** DIAMOND; GRAPHITE
TOSS-UP

13) EARTH SCIENCE  *Multiple Choice*  Which of the following is a volcanic rock that is so lightweight that it can sometimes float on water:

W) obsidian  
X) pitchstone  
Y) pumice  
Z) basalt

ANSWER: Y) PUMICE

BONUS

13) EARTH SCIENCE  *Short Answer*  What 4 planets of our solar system have the highest mean density?

ANSWER: MERCURY; VENUS; EARTH; MARS (in any order)

TOSS-UP

14) MATH  *Multiple Choice*  Which of the following best describes two angles that share a common side and a common vertex and do not overlap:

W) adjacent  
X) parallel  
Y) alternate  
Z) vertical

ANSWER: W) ADJACENT

BONUS

14) MATH  *Short Answer*  Subtract the following 2 polynomials and simplify:

\((6x^2 - 7x + 13) - (-x^2 + 4x - 3)\)

ANSWER: 7x^2 - 11x + 16
TOSS-UP
15) GENERAL SCIENCE  Short Answer  What is the common name for the organic solvent which is the main ingredient in nail polish remover?

ANSWER: ACETONE

BONUS
15) GENERAL SCIENCE  Short Answer  What element makes up about 24% of the Sun’s mass?

ANSWER: HELIUM

TOSS-UP
16) LIFE SCIENCE  Short Answer  What parts of a flower make up the corolla?

ANSWER: PETALS

BONUS
16) LIFE SCIENCE  Short Answer  Name all of the following 4 plants that have male and female flowers on the same plant: apple tree; tomato; maple tree; pumpkin

ANSWER: ALL
TOSS-UP

17) PHYSICAL SCIENCE  *Short Answer*  How many carbons are there in an ethanol molecule?

ANSWER:  2

BONUS

17) PHYSICAL SCIENCE  *Multiple Choice*  Which of the following is LEAST accurate regarding most solids:

W) particles in a solid vibrate around fixed positions  
X) particles in a solid have no kinetic energy  
Y) most solids are crystalline  
Z) solids have definite melting points in their pure state

ANSWER:  X) PARTICLES IN A SOLID HAVE NO KINETIC ENERGY

TOSS-UP

18) EARTH SCIENCE  *Multiple Choice*  Which of the following volcanic landforms is characterized by relatively quiet eruptions with little or no pyroclastic flows:

W) stratovolcano  
X) cinder cone  
Y) shield  
Z) caldera

ANSWER:  Y) SHIELD

BONUS

18) EARTH SCIENCE  *Multiple Choice*  Mudstone, or mudrock, is which of the following:

W) fine-grained sedimentary rock  
X) coarse-grained sedimentary rock  
Y) fine-grained metamorphic rock  
Z) coarse-grained metamorphic rock

ANSWER:  W) FINE-GRAINED SEDIMENTARY ROCK
TOSS-UP

19) MATH Short Answer If an ordered pair has an x-coordinate of zero, its graph lies on what part of the coordinate plane?

ANSWER: Y-AXIS (ACCEPT: VERTICAL AXIS)

BONUS

19) MATH Short Answer Name all of the following 4 fractions that are equivalent to \( \frac{2}{3} \):

\( \frac{5}{9}, \frac{16}{24}, \frac{36}{54}, \frac{4}{6} \)

ANSWER: \( \frac{16}{24}, \frac{36}{54} \)

TOSS-UP

20) GENERAL SCIENCE Short Answer In the United States, what crop is primarily used for ethanol fuel production?

ANSWER: CORN (ACCEPT: MAIZE)

BONUS

20) GENERAL SCIENCE Short Answer Name whether the following 3 substances are primarily derived from plants or animals, respectively: coal; cotton; lard

ANSWER: COAL = PLANT; COTTON = PLANT; LARD = ANIMAL
TOSS-UP

21) LIFE SCIENCE  Short Answer  How many chambers does the heart of a shark have?

ANSWER: 2

BONUS

21) LIFE SCIENCE  Short Answer  Name all of the following 4 groups of organisms in which mitosis occurs: birds; reptiles; mollusks; bacteria

ANSWER: BIRDS; REPTILES; MOLLUSKS (ACCEPT: ALL BUT BACTERIA)

TOSS-UP

22) PHYSICAL SCIENCE  Short Answer  What is the density, in grams per cubic centimeter, of a sample of plastic that floats with 45% of its volume submerged in pure water?

ANSWER: 0.45

BONUS

22) PHYSICAL SCIENCE  Short Answer  Ignoring friction, what is the acceleration, in meters per second squared, when 1,000 newtons of force are applied to move a 200-kilogram crate across a level floor?

ANSWER: 5

(Solution: A = F/M; A = 1000/200; A = 5 m/sec²)
TOSS-UP

23) EARTH SCIENCE  *Multiple Choice*  Marble is a metamorphic rock primarily composed of:

W) quartz  
X) granite  
Y) dolomite  
Z) calcite

ANSWER: Z) CALCITE

BONUS

23) EARTH SCIENCE  *Short Answer*  What unstable substance does the stratosphere contain that functions to protect life on Earth?

ANSWER: OZONE (ACCEPT: OZONE LAYER or O₃)

TOSS-UP

24) MATH  *Short Answer*  If 2 coplanar parallel lines are intersected by a transversal line, what is the sum of all angles formed?

ANSWER: 720

BONUS

24) MATH  *Short Answer*  Malcolm drove his car a distance of 2 miles in a time of 2 minutes 30 seconds. Find his average speed, in miles per hour:

ANSWER: 48
TOSS-UP

25) GENERAL SCIENCE  
*Short Answer*  What is the name for the plastic-ware consisting of two overlapping round plastic or glass dishes used by microbiologists in which to grow bacteria?

**ANSWER:** PETRI DISH (ACCEPT: PETRI)

BONUS

25) GENERAL SCIENCE  
*Multiple Choice*  Which of the following is typically used by a microbiologist for growing bacterial cultures in petri dishes:

W) autoclave  
X) incubator  
Y) laminar flow hood  
Z) fume hood

**ANSWER:** X) INCUBATOR