1) Math – Multiple Choice  Annie has 12 candy bars in a bag. Nine of them are Snick bars and 3 of them are Milky bars. If she randomly selects a candy bar from the bag, what are the odds that the bar will be a Milky bar?

W) 1 to 12
X) 1 to 4
Y) 1 to 3
Z) 3 to 1

ANSWER: Y) 1 to 3

BONUS

1) Math – Multiple Choice  A student makes the following conjecture: “If a quadrilateral is a rectangle, then it must be a parallelogram.” If someone doesn’t believe this conjecture is true, which of the following would be necessary to have a counterexample to it?

W) A rectangle that is a parallelogram
X) A parallelogram that is a rectangle
Y) A rectangle that is not a parallelogram
Z) A parallelogram that is not a rectangle

ANSWER: Y) A RECTANGLE THAT IS NOT A PARALLELOGRAM

TOSS-UP

2) Physical Science – Multiple Choice  A pencil sitting in a glass of water appears bent because light bends as it passes from water to the surrounding air and vice versa. This is an example of what process?

W) Reflection
X) Refraction
Y) Diffraction
Z) Absorption

ANSWER: X) REFRACTION

BONUS

2) Physical Science – Short Answer  Einstein received the Nobel Prize for his analysis of what physical phenomenon?

ANSWER: PHOTOELECTRIC EFFECT
TOSS-UP
3) Earth and Space – *Multiple Choice*  The dynamo effect enables Earth's core to generate what?

W) Electric field  
X) Mantle convection  
Y) Magnetic field  
Z) Radioactive elements  

ANSWER: Y) MAGNETIC FIELD

BONUS
3) Earth and Space – *Short Answer*  What devices are used to measure humidity?

ANSWER: HYGROMETERS  (ACCEPT: PSYCHROMETERS)

TOSS-UP
4) Life Science – *Short Answer*  What part of the brain is responsible for muscle coordination and is involved with muscle memory?

ANSWER: CEREBELLUM

BONUS
4) Life Science – *Short Answer*  By what process do bacterial cells divide?

ANSWER: BINARY FISSION
5) Energy – Short Answer  What is the SI unit of electric current?

ANSWER: AMPERE  (ACCEPT: AMPS)

5) Energy – Short Answer  Order the following countries from least to greatest in terms of the percentage of their power generation that comes from renewable energy sources: 1) United States; 2) Iceland; 3) Brazil.

ANSWER: 1, 3, 2

6) General Science – Multiple Choice  Where are Haversian canals found?

W) Pancreatic ducts
X) Liver portal veins
Y) Inside of bones
Z) Hair follicles

ANSWER: Y) INSIDE OF BONES

6) General Science – Short Answer  What is the common name of the chemical NH₃?

ANSWER: AMMONIA  (DO NOT ACCEPT: AMMONIUM)
TOSS-UP

7) Life Science – *Multiple Choice*  At which of the following pH values would pepsin be most active?

W) 2
X) 4
Y) 6
Z) 8

ANSWER: W) 2

BONUS

7) Life Science – *Short Answer*  What is the process of constructing an mRNA molecule from DNA?

ANSWER: TRANSCRIPTION

TOSS-UP

8) Physical Science – *Multiple Choice*  The nucleus of the most common isotope of hydrogen is formed from which of the following?

W) A single proton
X) A single neutron
Y) One proton and one electron
Z) One neutron and one proton

ANSWER: W) A SINGLE PROTON

BONUS

8) Physical Science – *Multiple Choice*  An electron is emitted by an atomic nucleus in the process of:

W) Alpha decay
X) Beta decay
Y) Nuclear fission
Z) Nuclear fusion

ANSWER: X) BETA DECAY
TOSS-UP

9) General Science – *Short Answer*  If a computer’s hard drive can hold 2 to the 40th bytes, it can hold one of what unit of storage capacity?

ANSWER: TERABYTE

BONUS

9) General Science – *Short Answer*  What name is given to a group of organisms that are the first to establish themselves in an area after a disruption?

ANSWER: PIONEER SPECIES

TOSS-UP

10) Math – *Multiple Choice*  Fifty is multiplied by a number between 0 and 1. Which of the following must be true about the product?

W) It is less than 1  
X) It is between 0 and 50  
Y) It is rational  
Z) It is irrational

ANSWER: X) IT IS BETWEEN 0 AND 50

BONUS

10) Math – *Multiple Choice*  Bobby saved $32 when he purchased a jacket at a clearance sale. If the sale price was 40% off the regular price, what was the regular price of the jacket?

W) $48  
X) $72  
Y) $80  
Z) $128

ANSWER: Y) $80
TOSS-UP

11) Energy – Short Answer  In a photovoltaic cell, two types of semiconductors are placed next to each other. What is the term for this point of contact?

ANSWER: P-N JUNCTION

BONUS

11) Energy – Short Answer  Order the following three sectors from least to greatest in terms of propane consumption in the US: 1) Residential; 2) Transportation; 3) Chemical and industrial.

ANSWER: 2, 1, 3

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TOSS-UP

12) Earth and Space – Short Answer  What is the spectral class of the Sun?

ANSWER: G  (ACCEPT: G2)

BONUS

12) Earth and Space – Short Answer  What is the term for the continuous or broken ring of coral reef that surrounds a lagoon?

ANSWER: ATOLL
TOSS-UP

13) General Science – Short Answer  Place the following four steps of mitosis in their proper order: 1) Anaphase; 2) Telophase; 3) Metaphase; 4) Prophase.

ANSWER: 4, 3, 1, 2

BONUS

13) General Science – Short Answer  What is the name of the monosaccharide that RNA possesses and DNA does not?

ANSWER: RIBOSE

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TOSS-UP

14) Physical Science – Multiple Choice  The ionosphere is a region of ionized gas in the upper atmosphere. The ionosphere is extremely important to:

W) The color of the sky
X) Rainbows
Y) Radio communication
Z) The ability of satellites to orbit earth

ANSWER: Y) RADIO COMMUNICATION

BONUS

14) Physical Science – Short Answer  What property of water causes it to form small droplets and allows water striders to walk across pools of water?

ANSWER: SURFACE TENSION
TOSS-UP

15) Math – Multiple Choice  Which of the following tests is most useful for determining whether or not a relation defined by a graph is a function?

W) Horizontal line test  
X) Vertical line test  
Y) Increasing test  
Z) First derivative test

ANSWER: X) VERTICAL LINE TEST

BONUS

15) Math – Short Answer  If each edge of a cube is decreased by 80%, by what percentage is the volume decreased?

ANSWER: 99.2 (ACCEPT: 99 1/5)

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TOSS-UP

16) Life Science – Short Answer  Photophosphorylation is used in the plant cell to generate what molecule?

ANSWER: ATP (ACCEPT: ADENOSINE TRIPHOSPHATE)

BONUS

16) Life Science – Short Answer  Identify all of the following three conditions that would denature a protein: 1) Heating to 130 degrees Celsius; 2) Adding 6 molar urea; 3) Adding 0.1 molar sodium chloride.

ANSWER: 1 AND 2
TOSS-UP

17) Earth and Space – Short Answer  What type of volcano is characterized by gently sloping sides and fluid basaltic lavas?

ANSWER: SHIELD VOLCANO

BONUS

17) Earth and Space – Short Answer  What is the term for large areas on continents that are composed of very ancient rocks?

ANSWER: CRATONS

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TOSS-UP

18) Life Science – Short Answer  In what organelle does the citric acid cycle occur?

ANSWER: MITOCHONDRIA

BONUS

18) Life Science – Short Answer  Sponges are part of what phylum?

ANSWER: PORIFERA
**TOSS-UP**

19) Energy – *Short Answer*  What state generates the most solar power in the United States?

**ANSWER: CALIFORNIA**

**BONUS**

19) Energy – *Short Answer*  A photovoltaic cell doped with phosphorous will result in what type of semiconductor?

**ANSWER: N-TYPE SEMICONDUCTOR**

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**TOSS-UP**

20) Math – *Short Answer*  As a decimal rounded to the hundredths place, what is 20% of 80% of 14?

**ANSWER: 2.24**

**BONUS**

20) Math – *Short Answer*  A mail order movie store is having a sale. For a limited time, DVD’s are $8.80 each and the shipping and handling charge for the order is $3.27. What is the largest number of DVD’s that can be bought for $100?

**ANSWER: 10**
TOSS-UP

21) Earth and Space – Short Answer  What term is used to describe recognizable groups of stars that are not constellations, such as the Big Dipper?

ANSWER: ASTERISM

BONUS

21) Earth and Space – Short Answer  What atmospheric gas is most responsible for ocean acidification?

ANSWER: CARBON DIOXIDE (CO₂)

TOSS-UP

22) General Science – Short Answer  What type of process occurs without heat entering or leaving the system?

ANSWER: ADIABATIC

BONUS

22) General Science – Short Answer  What pair of endocrine glands secrete epinephrine and norepinephrine?

ANSWER: ADRENAL GLANDS
TOSS-UP

23) Physical Science – Short Answer  According to Newton’s Laws, the net force acting on a body is the product of what two quantities?

ANSWER: MASS AND ACCELERATION

BONUS

23) Physical Science – Short Answer  What functional group is represented by –NH₂?

ANSWER: AMINE (ACCEPT: AMINO)