TOSS-UP

1) Life Science — *Multiple Choice*  What is the name for the microscopic pores on the surface of leaves and stems in plants through which gas exchange occurs?

W) Stele [*STEEl-ee*]
X) Phloem [*FLOW-em*]
Y) Cambium [*KAM-bee-um*]
Z) Stomata [*stow-MAH-tah*]

ANSWER: Z) STOMATA

BONUS

1) Life Science — *Multiple Choice*  Which of the following is NOT true of sister chromatids [*CROW-mah-tids*]?

W) They are connected by centromeres [*SEN-troh-meers*]
X) They are identical
Y) They are diploid [*DIH-ployd*]
Z) They contain different alleles [*Ah-LEELZ*]

ANSWER: Z) THEY CONTAIN DIFFERENT ALLELES

TOSS-UP

2) Math — *Short Answer*  What is 83 – 19 + 17?

ANSWER: 81

BONUS

2) Math — *Short Answer*  A triangle has two exterior angles that have degree measures of 115 and 120, respectively. What is the degree measure of their common remote interior angle?

ANSWER: 55
3) Life Science – Multiple Choice  The breakdown of molecules to obtain energy is which of the following?

W) Catabolism \textit{[cah-TAB-eh-lizm]}  
X) Anabolism \textit{[an-AB-beh-lizm]}  
Y) Respiration  
Z) Transpiration  

ANSWER: W) CATABOLISM

BONUS

3) Life Science – Multiple Choice  Which of the following human diseases is dominant?

W) Red-green color blindness  
X) Cystic fibrosis  
Y) Hemophilia  
Z) Huntington's disease  

ANSWER: Z) HUNTINGTON'S DISEASE

TOSS-UP

4) Earth and Space – Multiple Choice  Which of the following types of rocks typically exhibits stratification?

W) Igneous  
X) Metamorphic  
Y) Sedimentary  
Z) Biological  

ANSWER: Y) SEDIMENTARY

BONUS

4) Earth and Space – Multiple Choice  What is the term for small distinctive groups of stars within constellations?

W) Asterisms  
X) Clusters  
Y) Bands  
Z) Cliques  

ANSWER: W) ASTERISMS
TOSS-UP

5) Physical Science – Multiple Choice  For which of the following molecules would elemental analysis give you the molecular formula?

W) C₃H₆O₉
X) SiO₂
Y) C₆H₁₄
Z) H₈O₈

ANSWER: X) SiO₂

BONUS

5) Physical Science – Short Answer  Rank the following three isotopes from least to greatest in terms of their numbers of neutrons: 1) Carbon-14; 2) Nitrogen-14; 3) Oxygen-18.

ANSWER: 2, 1, 3

TOSS-UP

6) Energy – Multiple Choice  What role is fission-based nuclear power used for in the energy production and distribution grid?

W) Baseload
X) Peak
Y) Arbitrage
Z) Peak shaving

ANSWER: W) BASELOAD

BONUS

6) Energy – Short Answer  Increasing the amount of thermal energy contained in an object also increases what quantifiable property of the object?

ANSWER: TEMPERATURE
TOSS-UP

7) Math — Short Answer  Simplify the following expression: $a^7 \times a^5$

ANSWER: $a^{12}$

BONUS

7) Math — Short Answer  At the start of school, Jack scored 63 on his pre-test. At the end of the first week, he scored 68 on his post-test. Rounded to the nearest tenth of a percent, what is his percent increase?

ANSWER: 7.9

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TOSS-UP

8) Energy — Multiple Choice  In which of the following states would you not expect to find a coal mine?

W) Nevada
X) Illinois
Y) Louisiana
Z) North Dakota

ANSWER: W) NEVADA

BONUS

8) Energy — Multiple Choice  Coal is primarily used to generate electricity. Which of the following is the second largest use of coal?

W) Heating homes
X) Running factories
Y) Fueling trains
Z) Smelting and steelmaking

ANSWER: Z) SMELTING AND STEELMAKING
9) Physical Science – Multiple Choice  If the temperature of a gaseous medium through which a sound wave passes is decreased, what will happen to the speed of the wave?

W) It will increase
X) It will decrease
Y) It will remain the same
Z) It will fluctuate

ANSWER: X) IT WILL DECREASE

BONUS

9) Physical Science – Short Answer  Identify all of the following three quantities that, when changed, would affect the period of a pendulum: 1) Mass of the bob; 2) Density of the bob; 3) Length of the string.

ANSWER: 3 (ACCEPT: LENGTH OF THE STRING)

TOSS-UP

10) Math – Short Answer  What is the area of a right triangle with legs of length 4 and 7?

ANSWER: 14

BONUS

10) Math – Short Answer  A cell phone plan costs a fixed rate per month plus a charge per text message. One month, Sarah had 200 texts and her total bill was $34. The next month, she had 500 texts and her total bill was $52. In dollars, what is the fixed rate per month?

ANSWER: 22
TOSS-UP

11) Life Science – Multiple Choice Which of the following is a protein?

W) Triglycerides [try-GLIH-sir-ides]
X) Myoglobin [MY-oh-glow-bin]
Y) Uracil [YUR-ah-sil]
Z) Ribose [RYE-bose]

ANSWER: X) MYOGLOBIN

BONUS

11) Life Science – Multiple Choice Which of the following is not an ectotherm?

W) Otter
X) Gold fish
Y) Turtle
Z) Beetle

ANSWER: W) OTTER

TOSS-UP

12) Earth and Space – Multiple Choice The temperature of a body of water influences which of the following?

W) The temperature of the air above it
X) The formation of deserts
Y) Global climate change
Z) Salt concentration

ANSWER: W) THE TEMPERATURE OF THE AIR ABOVE IT

BONUS

12) Earth and Space – Short Answer ENSO is an acronym for an irregular periodical variation in sea surface temperatures and winds in the eastern tropical Pacific Ocean. What does ENSO stand for?

ANSWER: EL NIÑO-SOUTHERN OSCILLATION
TOSS-UP

13) Physical Science – Short Answer  An alpha particle is the nucleus of an atom of what element?

ANSWER: HELIUM

BONUS

13) Physical Science – Multiple Choice  What is the SI derived unit used to express power?

W) Joule [jool]
X) Erg
Y) Watt
Z) Newton

ANSWER: Y) WATT

TOSS-UP

14) Life Science – Multiple Choice  Which of the following cells can be described as totipotent [toh-TIH-puh-tent]?

W) IPS cell
X) Bone marrow cell
Y) Fibroblast stem cell
Z) Zygote [ZYE-goat]

ANSWER: Z) ZYGOTE

BONUS

14) Life Science – Multiple Choice  In which of the following classifications is a bacteriophage?

W) Moneran [mo-NEER-en]
X) Chordate [KOR-date]
Y) Virus
Z) Protist [PRO-tist]

ANSWER: Y) VIRUS
TOSS-UP

15) Earth and Space – *Short Answer*  What is the term for glacier-cut inlets that are now filled with water?

ANSWER: FJORD

BONUS

15) Earth and Space – *Multiple Choice*  A comet’s gas tail points in which of the following directions?

W) trailing behind its orbit
X) leading ahead along its orbit
Y) directly towards the Sun
Z) directly away from the Sun

ANSWER: Z) DIRECTLY AWAY FROM THE SUN

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TOSS-UP

16) Energy – *Multiple Choice*  Which of the following is not a form of energy?

W) Petroleum
X) Nuclear
Y) Chemical
Z) Thermal

ANSWER: W) PETROLEUM

BONUS

16) Energy – *Short Answer*  Identify all of the following four products that can be produced from the processing and refinement of petroleum: 1) Asphalt; 2) Paraffin; 3) Kerosene; 4) Propane.

ANSWER: ALL (1, 2, 3, 4)
TOSS-UP

17) Physical Science – Multiple Choice Which of the following is NOT true about magnets?

W) As two magnets move apart, the repelling force increases
X) Opposite poles attract each other
Y) If you break a magnet you have two new magnets
Z) Compasses are affected by magnetic fields

ANSWER: W) AS TWO MAGNETS MOVE APART, THE REPELLING FORCE INCREASES

BONUS

17) Physical Science – Short Answer If the speed of an object is tripled, by what factor is the kinetic energy multiplied?

ANSWER: NINE

TOSS-UP

18) Math – Short Answer Find the value of the following expression: open parenthesis 49² + 49 close parenthesis divided by 49.

ANSWER: 50

BONUS

18) Math – Short Answer What is the slope of the line through (–3, 3) and (6, –4)?

ANSWER: −7/9
TOSS-UP

19) Physical Science – Short Answer Over some period of time, a radioactive isotope decays until only 1/8 of the original element is present. How many half-lives passed during this time period?

ANSWER: 3

BONUS

19) Physical Science – Multiple Choice What physical quantity can be defined as the sum of all the possible microstates of a system?

W) Free energy
X) Enthalpy [EN-thul-pee]
Y) Entropy [EN-troh-pee]
Z) Heat

ANSWER: Y) ENTROPY

TOSS-UP

20) Earth and Space – Multiple Choice Which of the following types of stars has the weakest hydrogen Balmer lines?

W) A
X) F
Y) G
Z) B

ANSWER: Y) G

BONUS

20) Earth and Space – Multiple Choice Which of the following components of the interstellar medium is typically the least dense?

W) HI clouds
X) Molecular clouds
Y) Coronal gas
Z) Intercloud medium

ANSWER: Y) CORONAL GAS
21) Life Science – Short Answer  Microtubules [micro-\text{TUBE}-yules] and microfilaments make up what cellular structure in eukaryotes [YOU-care-ee-oats]?

ANSWER: CYTOSKELETON

BONUS

21) Life Science – Short Answer  If 6 molecules of CO₂ and 6 molecules of H₂O combine to form one glucose molecule, how many molecules of O₂ are also produced?

ANSWER: 6

TOSS-UP

22) Math – Short Answer  A triangle has two angles measuring 22 and 67 degrees, respectively. What is the degree measure of the third angle?

ANSWER: 91

BONUS

22) Math – Short Answer  Two dice are rolled. What is the probability that the product of the two numbers rolled is prime?

ANSWER: 1/6
TOSS-UP

23) Earth and Space – Short Answer  Disks of gas contract to form stars via what process?

ANSWER: ACCRETION

BONUS

23) Earth and Space – Short Answer  Identify all of the following three rocks that are likely generated by rapid cooling of lava: 1) Obsidian; 2) Pumice; 3) Rhyolite.

ANSWER: ALL OF THEM (ACCEPT: 1, 2, AND 3)