THUMB: ROUND ROBIN 3

1) Math – *Short Answer* There are 4 prime numbers between 1 and 10. How many prime numbers are there between 10 and 100?

ANSWER: 21 [AX]

2) Earth and Space – *Multiple Choice* Which of the following is NOT a type of active galaxy?

W) Starburst
X) Quasar
Y) Blazar
Z) Seyfert

ANSWER: W) Starburst [FJ]

3) Physics – *Short Answer* Electric field lines for two oppositely charged bars are typically parallel. However, at the ends, the electric fields point outward from the bars. What is this effect called?

ANSWER: Fringe effect (Accept: edge effect) [AX]

4) Chemistry – *Multiple Choice* In a thin layer chromatography setup with a non-polar pigment, which of the following solvents will cause it to rise the highest?

W) Hexane
X) Acetone
Y) Methanol
Z) Chloroform

ANSWER: W) Hexane [DS]

5) Biology – *Multiple Choice* Tubers and rhizomes are often mistaken to be part of the root system in plants, but actually make up which of the following organs?

W) Leaf
X) Petal
Y) Stem
Z) Apical bud

ANSWER: Y) Stem [FJ]

6) Math – *Short Answer* Compute the determinant of the 2 by 2 matrix with first row 8, 4 and second row 3, 6.

ANSWER: 36 [AX]

7) Earth and Space – *Short Answer* Identify all of the following three quantities that would be lower in a dioritic magma compared to a granitic magma: 1) Viscosity 2) Explosivity 3) Magnesium concentration

ANSWER: 1 and 2 [FJ]

8) Physics – *Multiple Choice* A block is placed on a ramp inclined at an angle of 75 degrees with respect to the horizontal. Which of the following is closest to the minimum coefficient of static friction required between the block and the ramp for the block to remain stationary?

W) 2
X) 3
Y) 4
Z) 5

ANSWER: Y) 4 [AX]

9) Chemistry – *Short Answer* The +3 phosphorus ion has how many valence electrons?

ANSWER: 2 [DS]

10) Biology – *Short Answer* By name or number, order the following 4 types of vertebrae from superior to inferior: 1) Sacral 2) Lumbar 3) Cervical 4) Thoracic

ANSWER: 3, 4, 2, 1 [SY]

11) Math – *Multiple Choice* How many integer powers of 2 are between 1 and 1 million, inclusive?

W) 18
X) 19
Y) 20
Z) 21

ANSWER: Y) 20 [AX]

12) Earth and Space – *Multiple Choice* Which of the following is an erosional desert landform?

W) Arete
X) Barchan
Y) Alluvial fan
Z) Yardang

ANSWER: Z) Yardang [FJ]

13) Physics – *Short Answer* Pineapple juice flows through a circular pipe with a radius of 1 meter at an unknown velocity. The pipe narrows to a circular spout with a radius of 0.25 meters, at which point the fluid's velocity is measured to be 25 meters per second. In meters per second, what was the original velocity of the pineapple juice?

ANSWER: 25/16 [AX]

14) Chemistry – *Short Answer* Which of the following acids is triprotic?

W) Hydrochloric acid
X) Nitric acid
Y) Sulfuric acid
Z) Phosphoric acid

ANSWER: Z) Phosphoric acid [DS]

15) Biology - *Multiple Choice* Secondary structures in proteins aren't usually picky about the side chains of its amino acids. However, in the context of alpha helix formation, which of the following amino acids has the highest probability to disrupt helices?

W) Glycine
X) Phenylalanine
Y) Alanine
Z) Glutamic acid

ANSWER: W) Glycine [SY]

16) Math – *Short Answer* Sean takes 4 hours to eat one pineapple and Flora takes 1 hour to eat one pineapple. How many hours would it take them to eat 100 pineapples if they were working together?

ANSWER: 80 [AX]

17) Earth and Space – *Short Answer* According to the Big Bang theory, order the following FOUR types of matter in order of first appearance in the universe's history: 1) Quark-gluon plasma 2) Plasma 3) Neutral gas 4) Ionized gas

ANSWER: 1, 2, 4, 3 [FJ]

18) Physics – *Short Answer* When a material is cooled below its critical temperature, the Meissner effect causes it to expel magnetic fields and become what type of conductor?

ANSWER: Superconductor (ACCEPT: SUPER) [AX]

19) Chemistry – *Multiple Choice* Which of the following is true about Grignard reagents?

W) They are strong acids
X) They can be made as solutions in water
Y) They must always contain magnesium
Z) They were discovered in the year 3,000 B.C. in Anatolia

ANSWER: Y) They must always contain magnesium [DS]

20) Biology – *Multiple Choice* Giving the binomial name, which of the following is the scientific name of chicken?

W) Mus musculus
X) Sus domesticus
Y) Gallus gallus
Z) Equus ferus

ANSWER: Y) Gallus Gallus [SY]