THUMB: ROUND ROBIN 1

1) Chemistry – *Multiple Choice* Which of the following colors do lithium ions most commonly produce in a flame test?

W) Blue
X) Green
Y) Red
Z) Yellow

ANSWER: Y) Red [DS]

2) Biology – *Multiple Choice* In which step of mitosis does the pulling action of kinetochore microtubules and the pushing action of polar microtubules cause sister chromatin to migrate to opposite sides of the cell?

W) Prophase
X) Metaphase
Y) Anaphase
Z) Telophase

ANSWER: Y) Anaphase [SY]

3) Math – *Short Answer* Austin works a very fulfilling job at Mathnasium. One busy Monday he helped 78 students, with half of them being elementary school students, one-third being middle school students, and the remaining being high school students. How many high school students did he help?

ANSWER: 13 [AX]

4) Earth and Space – *Multiple Choice* Lobate scarps, such as those observed on Mercury, are primarily composed of which of the following types of faults due to crustal compression?

W) Thrust
X) Normal
Y) Strike-slip
Z) Oblique

ANSWER: W) Thrust [FJ]

5) Physics – *Multiple Choice* According to the Impulse-Momentum theorem, the impulse delivered to an object is equal to its change in momentum. This impulse can be calculated from the area under which of the following graphs?

W) Force vs. Distance
X) Force vs. Time
Y) Work vs. Distance
Z) Work vs. Time

ANSWER: X) Force vs. Time [AX]

6) Chemistry – *Multiple Choice* Which of the following is the IUPAC name for isobutane?

W) 1-methyl-propane
X) 2-methyl-propane
Y) 3-methyl-propane
Z) 4-methyl-propane

ANSWER: X) 2-methyl-propane [AlX]

7) Biology - *Short Answer* What theory hypothesized that chloroplasts were originally free living prokaryotes before being engulfed by a larger cell and incorporated as an organelle?

ANSWER: Endosymbiosis [SY]

8) Math – *Multiple Choice* The Tribonacci sequence is defined such that each term is equivalent to the sum of the three terms immediately before it. Given that the 5th, 6th, and 7th terms of the sequence are 2, 4, and 7, respectively, which of the following numbers is NOT a Tribonacci number?

W) 13
X) 23
Y) 44
Z) 81

ANSWER: X) 23 [AX]

9) Earth and Space – *Short Answer* Western intensification is primarily a result of what pseudoforce resulting from the rotation of Earth?

ANSWER: Coriolis force [FJ]

10) Physics – *Short Answer* Fauna watched the F1 movie and thinks she's a professional. She drives recklessly, uniformly accelerating to 200 m/s over 10 seconds and decelerating at the same rate until she comes to a full stop. How many meters did Fauna travel in the elapsed time?

ANSWER: 2000 [AX]

11) Chemistry – *Short Answer* What gas law states that the volume of a gas corresponds proportionally to temperature when pressure stays constant?

ANSWER: Charles's Law (Accept: Ideal gas law) [DS]

12) Biology – *Short Answer* Your dad, 55 years of age, is in the emergency room for a condition common in the US. His labs indicated very high troponin and myoglobin levels. What condition, caused by a full or partial blockage of the coronary arteries, was your dad affected by?

ANSWER: Myocardial infarction, or heart attack [SY]

13) Math – *Short Answer* The Fish McNugget store sells fish nuggets in boxes of 3 and 10. What's the largest number of fish that Sean can NOT order from the Fish McNugget store?

ANSWER: 17 [AX]

14) Earth and Space – *Short Answer* A limestone column is formed when a stalactite connects with what similar deposit stemming from cave floors?

ANSWER: Stalagmite [FJ]

15) Physics – *Multiple Choice* Which of the following physical quantities is NOT unitless?

W) Refractive index
X) Reynolds number
Y) Dielectric constant
Z) Resistivity

ANSWER: Z) Resistivity [FJ]

16) Chemistry – *Multiple Choice* Which of the following is the oxidation state of potassium in potassium permanganate?

W) -7
X) +1
Y) +4
Z) +7

ANSWER: X) +1 [DS]

17) Biology – *Multiple Choice* The Ampullae of Lorenzini present in some fishes is most closely related to which of the following other organs?

W) Lateral Line
X) Semicircular canals
Y) Hair follicles
Z) Otoliths

Answer: W) Lateral Line [SY]

18) Math – *Short Answer* The distribution of science bowl questions written by CCA kids is normal with an average of 10 and a standard deviation of 5. Given that Austin wrote 25 questions, what would his z-score be?

ANSWER: 3 [AX]

19) Earth and Space – *Multiple Choice* The density wave theory best accounts for the formation of which of the following parts of a galaxy?

W) Galactic halo
X) Central black hole
Y) Spiral arms
Z) Central bulge

ANSWER: Y) Spiral arms [FJ]

20) Physics – *Short Answer* Arrange the following three allotropes of carbon by increasing thermal conductivity: 1) Fullerene 2) Diamond 3) Graphite

ANSWER: 1, 3, 2 [FJ]