THUMB: ROUND ROBIN 2

1) Biology - *Short Answer* By name or number, identify all of the following three plants that are bryophytes: 1) Liverworts 2) Horse tails 3) Club mosses

Answer: 1 only [SY]

2) Math – *Short Answer* Bob has 5 blubs, each of which is worth 4 dubs. 2 dubs can be traded for 6 clubs, and 3 clubs can be traded for one final gub. How many gubs could Bob buy with his 5 blubs?

ANSWER: 20 [AX]

3) Earth and Space – *Short Answer* The El Nino Southern Oscillation causes what circulation cell over the equatorial Pacific to periodically weaken or reverse?

ANSWER: Walker circulation (do not accept: trade winds) [FJ]

4) Physics – *Short Answer* Monke bites into a banana and realizes it tastes horrible. Standing on level ground, Monke spits out the banana with a whopping velocity of 49 m/s. Neglecting air resistance, in meters, what is the maximum horizontal distance the banana bit could travel before hitting the ground?

ANSWER: 245 [AX]

5) Chemistry – *Multiple Choice* Which element on the periodic table has the highest Pauling electronegativity?

W) Sulfur
X) Cesium
Y) Fluorine
Z) Platinium

ANSWER: Y) Fluorine [DS]

6) Biology - *Short Answer* (STRICTLY ENFORCE STALLS) Providing your answer from 5 prime to 3 prime, what is the mRNA complement of the sequence 3 prime T A C T 5 prime?

ANSWER: AUGA [SY]

7) Math – *Short Answer* On any given day, there is an 85% chance of rain when it snows and a 44% chance of snow when it rains. Given that there is a 90% chance of rain on any given day, what is the probability that there will be no rain tomorrow?

ANSWER: 10% [AX]

8) Earth and Space – *Multiple Choice* Malachite primarily derives its green color from which of the following elements?

W) Iron
X) Copper
Y) Lead
Z) Magnesium

ANSWER: X) Copper [FJ]

9) Physics – *Short Answer* Planet Thumb has escape velocity v. If the planet's radius remains the same but its density is halved, what will be its new escape velocity in terms of v?

ANSWER: $\sqrt{2}/2$ v [FJ]

10) Chemistry – *Short Answer* What is the pH of a 0.01 molar solution of nitric acid, assuming that nitric acid is a monoprotic acid that fully dissociates in water?

ANSWER: 2 [DS]

11) Biology – *Short Answer* The release of cytochrome c oxidase from the mitochondria into the cytoplasm of the cell is one trigger which can cause what process, known as the programmed death of a cell?

ANSWER: Apoptosis [SY]

12) Math - *Short Answer* What is the 10th derivative of the cosine of 2x?

ANSWER: -1024cos(2x) [OM]

13) Earth and Space – *Short Answer* Identify all of the following three astronomical phenomenon that are commonly used as spiral tracers: 1) Type II supernovae 2) H-II (read: H-two) regions 3) K-type stars

ANSWER: 1 and 2 [FJ]

14) Physics – *Multiple Choice* Which of the following properties of a non-Newtonian fluid varies under the application of stress?

W) Surface tension
X) Viscosity
Y) Density
Z) Young's modulus

ANSWER: X) Viscosity [FJ]

15) Chemistry – *Multiple Choice* Which of the following chemical reactions is spontaneous at all temperatures?

W) Combustion of kerosene in oxygen to produce carbon dioxide and water
X) Photosynthesis, which is the reaction of carbon dioxide and water to produce glucose
Y) The formation of ozone from diatomic oxygen
Z) The decomposition of water into diatomic hydrogen and oxygen gas

ANSWER: W) Combustion of kerosene in oxygen to produce carbon dioxide and water [DS]

16) Biology – *Short Answer* Ishank the rat is an r-selected species. R-selected species tend to follow what type of survivorship curve?

ANSWER: Type III (Accept: three) [FJ]

17) Math – *Short Answer* According to the rational root theorem, which of the following values could be a root of the polynomial 2x^2+14x+12?

W) 5
X) 6
Y) 7
Z) 8

ANSWER: X) 6 [AX]

18) Earth and Space – *Short Answer* The collision of Theia and the Earth is theorized to have created what astronomical body?

ANSWER: The Moon (Accept: Earth's Moon or equivalent) [FJ]

19) Physics – *Short Answer* Alexander pushes a 10-kilogram box across a floor with a constant force of 20 Newtons. If the box moves at a constant velocity of 5 meters per second, then in watts, what is the power being delivered by the person?

ANSWER: 100 [AX]

20) Chemistry – *Multiple Choice* Which of the following elements when used as a dopant in silicon produces an N-type semiconductor?

W) Boron
X) Carbon
Y) Phosphorus
Z) Aluminum

ANSWER: Y) Phosphorus [DS]