Lightning round:

1. Math toss up short answer: The product of the three numbers a, b, and c is 1001. Find the smallest possible value of a+b+c.

Answer: 31

2. Physics toss up multiple choice: A negatively charged particle is travelling north. There is a magnetic field pointing east, and an electric field pointing south. Which of the following is true:

W) The electric field will do no work on the particle

X) The magnetic field will do no work on the particle

X) The electric field will push the particle south

Y) The magnetic field will push the particle upward

Answer: X

3. Earth and Space toss up short answer: Name the process by which crystals formed in a cooling magma are segregated from the remaining liquid.

Answer: Fractional Crystallization

4. Biology toss up multiple choice: Which of the following is not a characteristic shared by both mammals and extant birds?

W) Endothermy

X) Descent from reptiles

Y) A dorsal, hollow nerve cord

Z) Teeth specialized for diverse diets

Answer: Z

5. Chemistry toss up multiple choice: Which of the following has the highest dipole moment when in the gas phase?

W) Hydrogen Fluoride

X) Ammonia

Y) Carbon Monoxide

Z) Cesium chloride

6. Energy tossup multiple choice: About what percent of the energy of Denmark is produced by wind?

W) 80

X) 60

Y) 40

Z) 20

7. Math toss up short answer A square has a side length of 4. A second square is placed in the first whose vertices lie a distance of 1 from the vertices of the original square. Find the area of the new square.

Answer: 10

8. Physics toss up short answer: A spring is in SHM with frequency f. If the mass on the spring is doubled, in terms of f, what is the frequency of the new harmonic motion?

Answer: f/(sqrt2)

9. Earth and space toss up short answer: What type of intrusions are sills?

Answer: concordant

10. Biology toss up multiple choice: Root pressure causes the exudation of water droplets which can be seen in the morning on tips of grass blades or the leaf margins of some small dicots. What is this exudation called?

Answer: guttation

11. Chemistry toss up short answer: For a trigonal planar electron arrangement, one s orbital is mixed with 2 p orbitals to obtain how many and what type of hybrid orbitals?

Answer: 3 sp2

12. Energy toss up multiple choice: Approximately what percent of oil in the U.S. is used for making transportation fuel?

W) 66

X) 46

Y) 26

Z) 6

Answer: W

13. Math toss up multiple choice Five coins are flipped. Then, another 5 coins are flipped, and finally, a third set of 5 coins are flipped. What is the probability that after each of these three sets of flips, the total number of flips is even.

W) 1/16

X) 1/8

Y) 5/32

Z) 1/4

Answer: X

14. Physics toss up short answer: Points A and B have potential difference Va=100 V and Vb=200 V. A charge q of -.05 C is moved from A to B through a curved path with length 20 cm. If the distance between A and B is 10 cm, what is the work done by the field on the charge?

Answer: -5 J

15. Earth and Space toss up short answer: What would the geothermal gradient be in

I. Nevada’s Great Basin

II. beneath Cental North America

Answer: Steep, shallow

16. Biology toss up multiple choice: What type of soil, made up of equal amounts of sand, silt, and clay is usually the most fertile?

Answer: Loams

17. Chemistry toss up multiple choice: What is the hybridization of sulfur in PF5

Answer: sp3d

18. Energy toss up multiple choice: Name all of the following three which help determine whether crude oil is called sweet or sour.

I. Its vinegar contenet

II. Its sugar content

III Its sulfur content

Answer: III only

19. Math toss up short answer: Compute the absolute difference between the number of squares and the number of rectangles contained in a 6 by 6 grid of squares.

W) 106

X) 216

Y) 350

Z) 441

Answer: Y

20. Physics toss up multiple choice: Two objects with the same mass collide with each other head on elastically. Which of the following is not true?

W) The object with the greater speed before the collision will have the greater speed after the collision

X) The forces that the cars exert on one another are conservative

Y) There is only one possibility for the final speeds and directions of the two objects after the collision

Z) If the cars instead stuck together, energy would be lost during the collision.

Answer: W

21. Earth and Space toss up short answer: What specific unit is the pressure with increasing depth in the Earth usually recorded in?

Answer: Kilobars

22. Biology toss up short answer: Order the following three stages from 1st to last in the evolution of the amniotic egg.

I. Dipnoi

II. Myxini

III. Crocodilia

Answer: 2, 1, 3

23. What does the abbreviation LCAO stand for?

Answer: Linear Combination of atomic orbitals

24. Energy toss up multiple choice: How many Gallons are in a barrel of oil?

W) 80

X) 68

Y) 42

Z) 30

Answer: Y

25. The Narp of a convex quadrilateral is defined to be the product of the square roots of the lengths of its sides times the sum of the lengths of its two diagonals times its perimeter divided by its area. If the side length of a square is doubled, by what factor will its Narp change?

W) 4

X) 8

Y) 16

Z) 32

Answer: W