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Science Bowl Lightning Round- Varied

1. BIOLOGY Multiple Choice: By how many times does the pH of the stroma differ from the pH of the thylakoid space in an illuminated chloroplast?  
  
W) 3  
X) 30  
Y) 10  
Z) 1000  
  
ANSWER: Z

2. CHEMISTRY Short Answer: How many neutrons are in nitrogen-15?

ANSWER: 8

3. PHYSICS Short Answer: A 5 kg ball is dropped at a height of 20 meters. Ideally, if no energy is lost as heat, what is the kinetic energy of the ball at 10 meters? Assume gravity is 10 m/ s^2.

ANSWER: 500 Joules

4. ASTRO/EARTH Multiple Choice: An mP air mass is:

W) dry and cold   
X) humid and warm  
Y) humid and cold  
Z) dry and warm

ANSWER: Y

5. MATH Short Answer: in the geometric sequence 2/3, 4/9… etc. what is the fifth term?

ANSWER: 32/243

6. BIOLOGY Short Answer: Which part of a mitochrondria is synonymous with the thylakoid space in terms of the proton-motive force during respiration and photosynthesis?

ANSWER: Intermembrane space

7. CHEMISTRY Short Answer: What is the charge of the silver ion?

ANSWER: 1+

8. PHYSICS Multiple Choice Giving your answer with 1 significant digit, what is the de Broglie wavelength in meters of an object at 800 kg moving at 8 m/s?

W) 53   
X) 1x10-45  
Y) 1 x 10^-37  
Z) 1 x 10^-63  
  
ANSWER: Y

9. ASTRO/EARTH Multiple Choice: Giving your answer with 1 significant digit, what is the diffraction limit in arcseconds of the Hubble Space Telescope (diameter: 24 meters) for visible light with a wavelength of 500 nanometers?

W) 0.05  
X) 7  
Y) 60.  
Z) 100  
  
ANSWER: W

10. MATH Multiple Choice: To the nearest digit, what is the angle between the vectors <-3, 4> and <2, 6/4>?

W) 23  
X) 35  
Y) 60  
Z) 90.   
  
ANSWER: Z

11. BIOLOGY Multiple Choice: Which of the following covers the young shoot of a grass seed like of maize?  
W) Coleoptile   
X) Radicle  
Y) Hypocotyl  
Z) Epicotyl  
  
ANSWER: W

12. CHEMISTRY Multiple Choice: How many sigma and pi bonds respectively are there in propene?

W) 2,4  
X) 4,5  
Y) 8,1  
Z) 3, 6  
  
ANSWER: Y

13. PHYSICS Multiple Choice: Which of the following is false?

W) In Beta plus decay a positron and electron neutrino are emitted.   
X) The atomic number decreases during electron capture.  
Y) Beta decay doesn’t change the number of nucleons.  
Z) Beta minus decay causes the atomic number to decrease by 1.   
  
ANSWER: Z

14. ASTRO/EARTH Short Answer: What is the stream of charged particles (such as protons and electrons) continually blown outward in all directions from the sun?

ANSWER: solar wind

15. MATH Multiple Choice What is the derivative of the function natural log of absolute value cosine of x end absolute value at the x-value pi/3?

W) – square root of 3   
X) 1/2  
Y) –square root of 3 over 2  
Z) root of 2 over 2  
  
ANSWER: W

16. BIOLOGY Short Answer: Which of the following is/are secreted by the anterior pituitary glands?  
1) ADH  
2) Epinephrine  
3) FSH  
4) Thyroxine  
  
ANSWER: 3

17. CHEMISTRY Multiple Choice: What are the units of the rate constant for zero order reactions? Concentration is measured with Molarity and time with seconds.

W) M/s  
X) 1/s  
Y) M^-2s-1  
Z) M^/1s^-1  
  
ANSWER: W

18. PHYSICS Short Answer: Name all of the following fermions which have charge +2/3.

Up quark, Muon, Gluon, Charm quark

ANSWER: Up and charm quarks

19. ASTRO/EARTH Short Answer: Name the four Jovian planets of our solar system.

ANSWER: Jupiter, Saturn, Uranus, Neptune

20. MATH Short Answer: What is the integral of csc quared of x?

ANSWER :-cotx + C

21. BIOLOGY Short Answer: What is the name of the activator that binds to the lac promoter when glucose is scarce?

ANASWER: CAP (catabolite activator protein)

22. CHEMISTRY: Multiple Choice: In the reaction CO (g) + 3 H2 (g) CH4 (g) + H2O (g), when you increase the concentration of water, which of the following is true?

W) Equilibrium will shift to the right.  
X) Equilibrium will shift to the left.  
Y) Equilibrium is unaffected.   
Z) The equilibrium constant decreases.   
  
ANSWER: x

23. PHYSICS Multiple Choice: An electromagnetic wave with a wavelength of 10^-4 nanometers is which of the following?

W) Gamma rays  
X) X-rays  
Y) UV  
Z) Infrared   
  
ANSWER: W

24. ASTRO/EARTH Multiple Choice: Which of the following is an example of a common silicate mineral?

W) Calcite  
X) Hematite  
Y) Quartz  
Z) Halite   
  
ANSWER: Y

25. MATH Short Answer: If the probability of rolling an even number on a weighted die is 2/3, what is the probability of getting 2 even numbers when rolling three times?

ANSWER: 4/9