

BASIS PEORIA SCIENCE BOWL

ROUND ROBIN ROUND 2

TOSS-UP

1) Biology – *Multiple Choice* Which of the following neurotransmitters is most prevalent in the human body?

W) Acetylcholine
X) Serotonin
Y) Dopamine
Z) Norepinephrine

ANSWER: W

BONUS

1) Biology – *Short Answer* One of the most important parts of the human brain, this structure is responsible for relaying both sensory and motor information alike to the appropriate area or section of the brain. It is responsible for relaying information from all of the main senses except olfaction. What is the name of this structure?

ANSWER: THALAMUS

TOSS-UP

2) Chemistry – *Short Answer* How many valence electrons does argon have?

ANSWER: 8

BONUS

2) Chemistry – *Short Answer* What group of the periodic table includes elements with 5 valence electrons and includes Arsenic?

ANSWER: Group 15

TOSS-UP

3) Physics – *Multiple Choice* The slope of a work over time graph is equal to what quantity?

W) Power
X) Force
Y) Acceleration
Z) Momentum

ANSWER: W) POWER

BONUS

3) Physics – *Multiple Choice* Which of the following is not a unit of electrical power?

W) Volt-Coulomb per second
X) Kilojoule per hour
Y) Ampere-volt
Z) Watt-hour

ANSWER: Z) WATT-HOUR

TOSS-UP

4) Math – *Short Answer* Give the expression for the surface area to volume ratio of a sphere with radius r.

ANSWER: 3/r

BONUS

4) Math – *Short Answer* What is the volume of a sphere with a radius of 3? Round to the nearest ten.

ANSWER: 110

TOSS-UP

5) Earth and Space – *Short Answer* The Cassini space probe found large plumes of water erupting from the South Pole of what moon of Saturn?

ANSWER: ENCELADUS

BONUS

5) Earth and Space – *Multiple Choice* The largest moon of Saturn, Titan, has large surface lakes that are composed of what liquid?

W) Methane
X) Water
Y) Nitrogen
Z) Ammonia

ANSWER: W) Methane

TOSS-UP

6) Energy – *Short Answer* Name the two most popular types of nuclear fission reactors in the United States?

ANSWER: Boiling - water reactor and pressurized - water reactor

BONUS

6) Energy – *Short Answer* Which of the following is an advantage of pressurized - water reactors over boiling - water reactors.

W) PWRs are easier to use and control.
X) PWRs have greater thermal efficiency.
Y) PWRs have less components than BWRs.
Z) PWRs produce dramatically less nuclear waste.

ANSWER: W) PWRs are easier to use and control.

TOSS-UP

7) Biology – *Multiple Choice* What is the study of the distribution and determinants of diseases within a population?

W) Public health
X) Epidemiology
Y) Biotechnology
Z) Medicine

ANSWER: X) Epidemiology

BONUS

7) Biology – *Short Answer* What is the most fatal viral disease in the world? This disease has a near 100% fatality rate with only a select few survivors. However, this disease is also extremely preventable as its vaccine is nearly 100% effective.

ANSWER: Rabies

TOSS-UP

8) Chemistry – *Short Answer* What is the most electronegative element?

ANSWER: Fluorine

BONUS

8) Chemistry – *Short Answe*r Name all of the following elements that are more electronegative than chlorine.

1) Oxygen

2) Nitrogen
3) Sulfur
4) Phosphorus

ANSWER: 1 ONLY

TOSS-UP

9) Physics – *Short Answer* The standard kinematic equations assume what value for jounce, in meters per second to the fourth power?

ANSWER: 0

BONUS

9) Physics – *Short Answer* Find the displacement in meters over a period of 2 seconds of an object with zero initial velocity, zero initial acceleration, and a jerk of 3 meters per second cubed.

ANSWER: 4 METERS

TOSS-UP

10) Math – *Short Answer* If you roll two fair six sided dice, what is the probability of rolling a 7?

ANSWER: 1/6

BONUS

10) Math – *Short Answer* Answer the following 2 questions about probability.

A) When rolling two fair six sided dice what is the probability of rolling a 9 or a 3?
B) What is the probability of drawing a jack or king from a standard 52 card deck?

ANSWER: ⅙; 2/13

TOSS-UP

11) Earth and Space – *Short Answer* Which mineral has a hardness of 7 on the Mohs scale?

ANSWER: QUARTZ

BONUS

11) Earth and Space – *Short Answer* The mineral hornblende has which of the following silicate structures?

W) Single tetrahedra

X) Single chains
Y) Double chains
Z) Sheets

ANSWER: Y) Double chains

TOSS-UP

12) Energy – *Multiple Choice* Which of the following energy sources does not utilize steam to turn a turbine?

W) Coal
X) Solar
Y) Hydroelectric
Z) Geothermal

ANSWER: X) Solar

BONUS

12) Energy – *Short Answer* One type of solar thermal power plant involves multiple reflectors focusing the sun's rays on a single receiver. What general shape are these reflectors to maximize the light intensity that it shined upon the receiver?

ANSWER: Parabola

TOSS-UP

13) Biology – *Short Answer* What is the name of substances that assist enzymes in their activity? These substances are usually small organic molecules or metals.

ANSWER: Cofactors

BONUS

13) Biology – *Short Answer* What disease is caused by a deficiency in an important cofactor that enables red blood cells to carry oxygen?

ANSWER: Anemia

TOSS-UP

14) Chemistry – *Short Answer* Which thermodynamic state variable is a measure of the average energy of a system's particles?

ANSWER: TEMPERATURE

BONUS

14) Chemistry – *Short Answe*r What thermodynamic potential represents the maximum amount of reversible work a system can do at constant temperature and pressure?

ANSWER: GIBBS FREE ENERGY

TOSS-UP

15) Physics – *Multiple Choice* Which of the following electrical components is not incrementally passive?

W) Transformer
X) Diode
Y) Transistor
Z) Resistor

ANSWER: Y) TRANSISTOR

BONUS

15) Physics – *Short Answer* What is the secondary voltage of a transformer, in Volts, if the primary voltage is 6 V, the number of primary coils is 4, and the number of secondary coils is 6?

ANSWER: 9

TOSS-UP

16) Math – *Short Answer* What term describes two angles that sum to 180 degrees?

ANSWER: SUPPLEMENTARY

BONUS

16) Math – *Short Answer* What is the sum of the exterior angles of a regular hexagon?

ANSWER: 360

TOSS-UP

17) Earth and Space – *Multiple Choice* A large solar flare can trigger what event, in which a great quantity of the sun's atmosphere gets ejected into space?

W) Solar prominence
X) Sunspot explosion
Y) Coronal mass ejection
Z) Magnetic field reversal

ANSWER: Y) CORONAL MASS EJECTION

BONUS

17) Earth and Space – *Multiple Choice* The sun will eventually shed off its outer layers, leaving only its core as what object?

W) Neutron star
X) Blue dwarf
Y) White dwarf
Z) Brown dwarf

ANSWER: Y) White dwarf

TOSS-UP

18) Energy – *Multiple Choice* What elementary particle is the carrier of the strong force

W) W and Z boson
X) Photon
Y) Graviton
Z) Gluon

ANSWER: Z) Gluon

BONUS

18) Energy – *Short Answer* Photons are able to travel at the speed of light because they do not interact with a certain field, which gives them a rest mass of 0. Provide the name of the quantum particle that produces this field.

ANSWER: Higgs Boson

TOSS-UP

19) Biology – *Short Answer* What structure in the eye is responsible for focusing light that enters the eye on the retina?

ANSWER: Lens

BONUS

19) Biology – *Short Answer* What are the two major types of fluids in the eye?

ANSWER: Aqueous Humor and Vitreous Humor

TOSS-UP

20) Chemistry – *Short Answer* What unit for pressure is defined as exactly 100 kPa?

ANSWER: BAR

BONUS

20) Chemistry – *Short Answe*r What law states that the total pressure in a reaction chamber is equal to the sum of the partial pressures of the components?

ANSWER: DALTON'S LAW OF PARTIAL PRESSURES (ACCEPT: DALTON'S LAW)

TOSS-UP

21) Physics – *Short Answer* What is the rotational equivalent of mass?

ANSWER: MOMENT OF INERTIA

BONUS

21) Physics – *Multiple Choice* What is the term for the root mean square distance of the object's parts from its center of mass?

W) Centroidal Axis
X) Radius of Gyration
Y) Gyration Tensor
Z) Moment of Area

ANSWER: X) RADIUS OF GYRATION

TOSS-UP

22) Math – *Short Answer* Convert 300 degrees to radians. Give your answer in terms of pi.

ANSWER: 5*pi/3

BONUS

22) Math – *Short Answer* In a circle of area 16, what is the degree measure in radians of a sector of area 10? Give your answer in terms of pi.

ANSWER: 5pi/4

TOSS-UP

23) Earth and Space – *Multiple Choice* What is the term for an event in which two stars hit each other and combine into a new star, throwing a lot of gas into space?

W) Type III supernova
X) Stellar merger
Y) Binary eruption
Z) Red nova

ANSWER: Z) RED NOVA

BONUS

23) Earth and Space – *Short Answer* After a red nova, what is the term for the single star that is left behind?

ANSWER: BLUE STRAGGLER