Science Bowl Questions

1. Toss Up- Multiple Choice Biology

Most cells cannot harness heat to perform work because

w) Heat is not a form of energy

x) Cells do not have much heat and they are relatively cool

y) Heat is never used to do work

**z) Temperature is uniform all throughout cell**

Bonus- Short Answer

The type of endocytosis that is also called “cellular eating” is called

**Phagocytosis**

1. Toss Up- Short Answer Math

The derivative of 4x^5 + 3x is

**20x^4 + 3**

Bonus- Short Answer Math

The radius r of a circle is increasing at a rate of 3cm per minute. Find the rate of change of the area when r is equal to 6.

**36 square centimeters per minute**

1. Toss Up- Multiple Choice Biology

The function of the Golgi apparatus in the cell is

w) Cellular respiration

x) Breakdown of cell macromolecules and damaged organelles

**y) Synthesis of many polysaccharides**

z) Photosynthesis

Bonus- Short Answer

The fluid held under pressure in a closed body compartment is called

**Hydrostatic skeleton**

1. Toss Up- Multiple Choice Math

Sin 2u is also displayed as

w) sin 2u cos 2u

**x) 2sin u cos u**

y) 2 sin u tan u

z) 2 tan u

Bonus- Short Answer

What is the slope of the function f(x) = 2x-3 at point (2,1)

**m=2**

1. Toss Up- Multiple Choice Biology

The protein that is loosely bound to the surface of the membrane is

w) Integral proteins

**x) Peripheral proteins**

y) Transmembrane protein

z) Glycoprotein

Bonus- Short Answer

A molecule that binds specifically to a receptor site of another molecule is

**Ligands**

1. Toss Up- Short Answer Math

What is the derivative of sinx?

**Cosx**

Bonus- Short Answer

What is the velocity function of the position function s(t) = -16t^2+ 16t+ 8?

**V(t) = -32t + 16**

1. Toss Up- Short Answer Biology

NADP⁺ stands for…

**Nicotinamide Adenine Dinucleotide Phosphate**

Bonus- Short Answer

The Calvin cycle is used in what process?

**Photosynthesis**

1. Toss Up- Multiple Choice Math

What is sec²x – 1 equal to?

**w) tan²x**

x) csc²x

y) tan²x - 1

z) csc²x – 1

Bonus- Short Answer

4

Ʃ (n+iᶰ)

n = 1

**10**

1. Toss Up- Multiple Choice Biology

What is the motion of cilia?

w) right to left

x) left to right

y) snake-like motion

z) back and forth

Bonus- Short Answer

Where do microtubules grow out of in animal cells?

**In the Centrosome**

1. Toss- Up Multiple Choice Math

When is a function differentiable at x?

w) When it is continuous

x) When it is not continous

**y) When the derivative exists at x**

z) When there is a vertical tangent line at x

Bonus- Short Answer Math

What is the second derivative of f(x) = sinx²

**2(cosx²- 2x² sinx²)**

1. Toss Up- Short Answer Biology

How many phosphate groups are in an ATP?

**3 Phosphate Groups**

Bonus- Short Answer

Which inorganic molecule is released from ATP when converting to ADP?

**Inorganic Phosphate (HOPO₃²⁻)**

1. Toss Up- Multiple Choice Biology

The type of membrane traffic where a cell must expand energy is called

w) Cotransport

x) Facilitated diffusion

y) Passive transport

**z) Active transport**

Bonus- Short Answer

Which model was proved incorrect by G. Nicolson’s fluid mosaic model about the membrane?

**Davson-Danielli Sandwich Model**

1. Toss Up- Short Answer Biology

The dense fluid in the chloroplast is called

**The Stroma**

Bonus- Short Answer Biology

In which catabolic process is there a partial degradations of sugars because of the lack of oxygen?

**Fermentation**

1. Toss Up- Multiple Choice Biology

According to the fluid mosaic model of the membrane, the proteins of the membranes are

w) Confined to the cytoplasmic side of the membrane

x) Confined to the extracellular side of the membrane

**y) Embedded in the lipid bilayer**

z) Randomly placed in the membrane

Bonus- Short Answer

What is osmoregulation in the relationship of a cell?

**The control of water balance in plasma membrane**

1. Toss Up- Short Answer Biology

Using either numbers or words, denote which of the following are functions of membrane proteins.

1. Transport solutes and substances through membrane
2. Enzymatic Activity
3. Intercellular Joining

**1, 2, and 3 or all of them**

Bonus- Short Answer

Each aquaporin lets in how many water molecules?

**3 billion water molecules**

1. Toss Up- Short Answer Biology

The reaction that proceeds with a net release of free energy is called

**Exergonic Reaction**

Bonus- Short Answer

What is the formula for cellular respiration?

**C₆H₁₂O₆ + 6 O₂ yields 6 CO₂ + 6 H₂O**

1. Toss Up- Short Answer Biology

ATP stands for

**Adenosine Triphosphate**

Bonus- Short Answer

The products that are created during hydrolysis of sucrose by sucrase are

**Glucose and Fructose**

1. Toss Up- Short Answer Biology

NAD⁺ is also called

**Nicotinamide Adenine Dinucleotide**

Bonus- Short Answer

The enzyme that oxidizes substrate are called

**Dehydrogenases**

1. Toss Up- Short Answer Biology

A photosystem is composed of a protein complex called a

**Reaction-Center Complex**

Bonus- Short Answer

Each photoexcited electron passes through the primary electron acceptor of Photosystem I and Photosystem II via a(an)

**Electron Transport Chain**

1. Toss-Up- Multiple Choice Biology

Which photosystem does cyclic electron flow?

**w) Photosystem I**

x) Photosystem II

y) Photosystem III

z) Photosystem IV

Bonus- Short Answer

Chloroplasts and mitochondria generate ATP by what basic mechanism?

**Chemiosmosis**

1. Toss Up- Short Answer Biology

What does CAM stand for in relationship with plants?

**Crassulacean Acid Metabolism**

Bonus- Short Answer

What cells in the CAM plants store organic acids in its vacuoles?

**Mesophyll** **Cells**

1. Toss Up- Short Answer Biology

What are the three types of isomers?

Structural isomers, Enantiomers, and Geometric isomers

Bonus- Short Answer

What is the characteristic of a structural isomer in relationship to covalent partners?

**They differ in covalent partners.**

1. Toss Up- Multiple Choice Biology

What is a hydrophilic substance?

**w) A substance that is attracted or “loves” water.**

x) A substance that repels water

y) A substance that is mildly attracted to water

z) A substance that is attracted to air

Bonus- Short Answer

What is an example of when a hydrophilic substance does not dissolve?

**Cotton**

1. Toss Up- Short Answer Biology

Organic molecules that consist of only hydrogen and carbon are called

**Hydrocarbons**

Bonus- Short Answer

An example of hydrocarbons that have double bonds are

**Butene**

1. Toss Up- Short Answers Biology

The membrane carbohydrates that are covalently bonded to lipids are called \_\_\_

**Glycolipids**

Bonus- Short Answer Biology

The diffusion of water across a selectively permeable membrane is called

**Osmosis**