

# BIOLOGY

## 1. BIOLOGY

Writer: Siam Muquit

Toss Up: Short Answer

In eukaryotes, which enzyme proofreads while DNA replication takes place?

Bonus Answer: DNA Polymerase (accept DNA Polymerase III)

---

Bonus: Short Answer

What is the general name for a point mutation in which a single nucleotide change results in a codon that codes for a different amino acid?

Bonus Answer: missense mutation

---

## 2. BIOLOGY

Writer: Siam Muquit

Toss Up: Multiple Choice

Modern research has shown that silent mutations can be harmful in all of the following ways except:

W) Causing a short pause during codon-anticodon pairing in translation

X) Reducing the stability of the mRNA's 3D structure

Y) Causing improper splicing of the primary transcript

Z) Slowing the rate of transport of mRNA across the nuclear membrane

Toss Up Answer: Z

---

Bonus: Short Answer

Which type of RNA is most common in the cell?

Bonus Answer: rRNA

---

## 3. BIOLOGY

Writer: Siam Muquit

Toss Up: Multiple Choice

Which of these is not a stop codon?

W) UAA

X) UGG

Y) UGA

Z) UAG

Toss Up Answer: X

---

Bonus: Short Answer

What was the first codon-amino acid pair to be identified? (Give both the codon and the amino acid)

Bonus Answer: UUU and phenylalanine

---

## 4. BIOLOGY

Writer: Siam Muquit

Toss Up: Short Answer

Which amino acid would constitute a disulfide bridge?

Bonus Answer: Cysteine

---

Bonus: Short Answer

What is the name of the cellular machinery that removes introns?

Bonus Answer: Spliceosome

---

## 5. BIOLOGY

Writer: Siam Muquit

Toss Up: Multiple Choice

Which process is in play when we respond less strongly to repeated stimuli over time?

W) Sensory Adaptation

X) Habituation

Y) Accomodation

Z) Maturation

Toss Up Answer: X

---

Bonus: Multiple Choice

The learning phase during which a conditioned response is established is called:

W) Learning

X) Possession

Y) Acquisition

Z) Incubation

Bonus Answer: Y

---

## 6. BIOLOGY

Writer: Siam Muquit

Toss Up: Multiple Choice

Which is not associated with the proteasomal degradation pathway?

W) Response to oxidative stress

X) Regulation of gene expression

Y) Kinetochore attachment

Z) The Cell cycle

Toss Up Answer: Y

---

Bonus: Short Answer

If a reaction with a Delta G of +3.4 kcal/mol is coupled with ATP hydrolysis, what is the net Delta G?

Bonus Answer: -3.9 kcal/mol

---

## 7. BIOLOGY

Writer: Siam Muquit

Toss Up: Short Answer

The strongest known biological oxidizing agent plays a key role in photosynthesis. What is it called?

Bonus Answer: P680

---

Bonus: Short Answer

What was the phage that Hershey and Chase used in their experiments, and what two radioactive substances did they tag it with?

Bonus Answer: T2, S35 and P32 (Do NOT accept Sulfur and Phosphorus)

---

## 8. BIOLOGY

Writer: Siam Muquit

Toss Up: Multiple Choice

Which experimental treatment would increase the rate of sucrose transport into a plant cell?

- W) decreasing extracellular sucrose concentration
- X) decreasing extracellular pH
- Y) decreasing cytoplasmic pH
- Z) adding a substance that makes the membrane more permeable to H<sup>+</sup> ions

**Toss Up Answer: X**

---

**Bonus: Short Answer**

If the entire cell cycle in a certain cell takes 24 hours, how long does mitosis take?

**Bonus Answer: 2 hours**

---

## 9. BIOLOGY

**Writer: Siam Muquit**

**Toss Up: Multiple Choice**

After three rounds of cell fractionation, the pellet would be rich in:

- W) nuclei
- X) microsomes
- Y) mitochondria
- Z) ribosomes

**Toss Up Answer: X**

---

**Bonus: Multiple Choice**

P53 is a

- W) tumor-inducing protein
- X) tumor-suppressing protein
- Y) tumor-inducing hormone
- Z) tumor-suppressing hormone

**Bonus Answer: X**

---

## 10. BIOLOGY

**Writer: Siam Muquit**

**Toss Up: Multiple Choice**

Which of these would not be found in a plant vacuole?

- W) pigments
- X) poisons
- Y) inorganic ions
- Z) smaller organelles

**Toss Up Answer: Z**

---

**Bonus: Short Answer**

Which cytoskeletal element has a diameter of 7nm?

**Bonus Answer: Microfilament**

---

## 11. BIOLOGY

**Writer: Siam Muquit**

**Toss Up: Short Answer**

Which model is currently accepted as representative of the dynamic nature of the Golgi apparatus?

**Bonus Answer: Cisternal Maturation model**

---

**Bonus: Short Answer**

Which cytoskeletal element functions in cleavage furrow formation?

**Bonus Answer: Microfilament**

=====

**12. BIOLOGY**

**Writer: Siam Muquit**

**Toss Up: Short Answer**

Name the two types of cell death.

**Bonus Answer: Apoptosis, Necrosis**

=====

**Bonus: Short Answer**

In C4 and CAM photosynthesis, which specific enzyme is used to fix CO<sub>2</sub> in lieu of RuBisCO?

**Bonus Answer: PEP Carboxylase**

=====

**13. BIOLOGY**

**Writer: Siam Muquit**

**Toss Up: Short Answer**

Give the genus and species name of the organism that Beadle and Tatum worked with.

**Bonus Answer: Neurospora crassa**

=====

**Bonus: Short Answer**

Archibald Garrod is credited with the discovery of which disease, characterized by blackened urine?

**Bonus Answer: Alkaptonuria**

=====

**14. BIOLOGY**

**Writer: Amrit Hingorani**

**Toss Up: Multiple Choice**

What branching nerve fibers receive messages?

- W) Axons
- X) Axes
- Y) Dendrons
- Z) Dendrites

**Toss Up Answer: Z**

=====

**Bonus: Multiple Choice**

What protein was first isolated in red blood cells?

- W) Myoglobin
- X) Hemocyanin
- Y) Spectrin
- Z) Collagen

**Bonus Answer: Y**

=====

**15. BIOLOGY**

**Writer: Amrit Hingorani**

**Toss Up: Multiple Choice**

Which mollusk does not possess a radula?

- W) Squid

X) Scallop

Y) Snail

Z) Chiton

**Toss Up Answer: X**

---

**Bonus: Short Answer**

What is the scientific name for the job or role an organism plays in its habitat?

**Bonus Answer: Niche**

---

## 16. BIOLOGY

**Writer: Amrit Hingorani**

**Toss Up: Multiple Choice**

How many cotyledons do edicts have?

W) 5

X) 1

Y) 0

Z) 2

**Toss Up Answer: Z**

---

**Bonus: Short Answer**

How many stages in a butterfly's life cycle?

**Bonus Answer: Four (4)**

---

## 17. BIOLOGY

**Writer: Amrit Hingorani**

**Toss Up: Multiple Choice**

Which of these human diseases is not cause by roundworms?

W) Filariasis

X) Ancylostomiasis

Y) Ascariasis

Z) Typhoid fever

**Toss Up Answer: Z**

---

**Bonus: Short Answer**

What hormone causes vesicles carrying aquaporins to imbed in the membranes of cells in the collecting duct?

**Bonus Answer: ADH (Antidiuretic hormone)**

---

## 18. BIOLOGY

**Writer: Amrit Hingorani**

**Toss Up: Multiple Choice**

Which of the following is most closely related to sharks?

W) Trout

X) Blue Gill

Y) Manta Ray

Z) Octopus

**Toss Up Answer: Y**

---

**Bonus: Short Answer**

Who invented the polio vaccine?

**Bonus Answer: Jonas Salk**

---

## 19. BIOLOGY

Writer: Amrit Hingorani

Toss Up: Multiple Choice

Which part of the brain is associated with coordinated movement?

W) Cerebrum

X) Cerebellum

Y) Diencephalon

Z) Corpus Callosum

Toss Up Answer: X

---

Bonus: Short Answer

What is the major excitatory neurotransmitter in the brain?

Bonus Answer: Glutamate

---

## 20. BIOLOGY

Writer: Amrit Hingorani

Toss Up: Multiple Choice

What is another name for the cell body of neurons?

W) Stroma

X) Soma

Y) Cellulite

Z) Thylakoid

Toss Up Answer: X

---

Bonus: Short Answer

What molecule do Ras protein's hydrolyze?

Bonus Answer: GTP

---

## 21. BIOLOGY

Writer: Amrit Hingorani

Toss Up: Multiple Choice

What is MYC?

W) Holoenzyme

X) Oncogene

Y) DNA

Z) Scientist name

Toss Up Answer: X

---

Bonus: Short Answer

What is the pacemaker of the heart?

Bonus Answer: SA (sinoatrial) node

---

## 22. BIOLOGY

Writer: Jason Mohabir

Toss Up: Multiple Choice

Researchers in 2015 reported that resistance to a certain antibiotic was found in a growing number of bacteria from meat samples in China. What is the name of this antibiotic that treats Gram-negative bacteria?

W) Colistin

X) Carbapenems

- Y) Linezolid
- Z) Vancomycin

**Toss Up Answer: W**

---

**Bonus: Short Answer**

What is the name of polymer in bacterial walls not found in Gram-negative bacteria?

**Bonus Answer:**

Peptidoglycan

---

**23. BIOLOGY**

**Writer: Amrit Hingorani**

**Toss Up: Short Answer**

Which structural component of the cell cytoskeleton has alpha and beta subunits and is involved with intracellular transport?

**Bonus Answer: Microtubules**

---

**Bonus: Short Answer**

What are the units of inheritance?

**Bonus Answer: Genes (accept DNA)**

---

**24. BIOLOGY**

**Writer: William Chan**

**Toss Up: Multiple Choice**

Each of the following molecules is a polymer EXCEPT:

- W) protein
- X) glucose
- Y) cellulose
- Z) starch

**Toss Up Answer: X**

---

**Bonus: Multiple Choice**

Hydrophilic properties are characteristic of all of the following EXCEPT:

- W) polar molecules
- X) molecules soluble in water
- Y) molecules that readily ionize in water
- Z) the long hydrocarbon chain components of some molecules

**Bonus Answer: Z**

---

**25. BIOLOGY**

**Writer: William Chan**

**Toss Up: Multiple Choice**

All of the following processes release carbon dioxide EXCEPT:

- W) the Krebs's cycle
- X) alcohol fermentation
- Y) oxidative phosphorylation
- Z) the conversion of pyruvate to acetyl CoA

**Toss Up Answer: Y**

---

**Bonus: Multiple Choice**

All of the following processes produce ATP EXCEPT:

- W) glycolysis
- X) the Krebs's cycle
- Y) lactic acid fermentation
- Z) oxidative phosphorylation of NADH

**Bonus Answer: Y**

=====

**26. BIOLOGY**

**Writer: Calvin Aw**

**Toss Up: Short Answer**

How many turns of the Calvin Cycle are needed to make 1 glucose molecule?

**Bonus Answer: 6**

---

**Bonus: Short Answer**

How many molecules of ATP are required to make a glucose molecule in the Calvin Cycle?

**Bonus Answer: 18 molecules of ATP (also accept "18", or "18 molecules")**

=====

**27. BIOLOGY**

**Writer: William Chan**

**Toss Up: Multiple Choice**

A product of noncyclic photophosphorylation is

- W) NADPH
- X) water
- Y) carbon dioxide
- Z) ADP

**Toss Up Answer: W**

---

**Bonus: Multiple Choice**

All of the following occur in cyclic photophosphorylation EXCEPT:

- W) Electrons move along an electron transport chain.
- X) Electrons in chlorophyll become excited.
- Y) ATP is produced.
- Z) NADPH is produced.

**Bonus Answer: Z**

=====

**28. BIOLOGY**

**Writer: William Chan**

**Toss Up: Multiple Choice**

If a cell has 46 chromosomes at the beginning of mitosis, then at anaphase there would be a total of

- W) 23 chromatids
- X) 23 chromosomes
- Y) 46 chromosomes
- Z) 92 chromosomes

**Toss Up Answer: Z**



---

**Bonus: Multiple Choice**

All of the following statements are true EXCEPT:

- W) spindle fibers are composed largely of microtubules.
- X) centrioles consist of nine triplets of microtubules arranged in a circle.
- Y) all eukaryotic cells have centrioles
- Z) many of the microtubules in a spindle apparatus attach to kinetochores of chromosomes

**Bonus Answer: Y**

=====

**29. BIOLOGY**

**Writer: William Chan**

**Toss Up: Multiple Choice**

The inheritance of skin color in humans is an example of which of the following?

- W) pleiotropy
- X) codominance
- Y) epistasis
- Z) polygenic inheritance

**Toss Up Answer: Z**

=====

**Bonus: Multiple Choice**

A human genetic defect that is caused by nondisjunction of the sex chromosomes is

- W) sickle-cell disease
- X) hemophilia
- Y) red-green color blindness
- Z) Turner syndrome

**Bonus Answer: Z**

=====

**30. BIOLOGY**

**Writer: William Chan**

**Toss Up: Multiple Choice**

Genetic variation can be introduced into bacteria by all of the following methods EXCEPT:

- W) transfer of DNA between bacteria through pili
- X) mutation
- Y) transformation
- Z) DNA amplification

**Toss Up Answer: Z**

=====

**Bonus: Multiple Choice**

An mRNA actively being translated in the cytoplasm would have all of the following EXCEPT:

- W) a poly-A tail
- X) a 5' (read as 5 prime) cap
- Y) exons
- Z) introns

**Bonus Answer: Z**

=====

### 31. BIOLOGY

Writer: William Chan

#### Toss Up: Multiple Choice

All of the following are examples of substances found in bacteria or archaea EXCEPT:

- W) peptidoglycan
- X) flagellin
- Y) chitin
- Z) phycobilin

Toss Up Answer: Y

---

#### Bonus: Multiple Choice

Which of the following groups of organisms lacks motility?

- W) Cellular slime molds
- X) Ciliates
- Y) Dinoflagellates
- Z) Apicomplexans

Bonus Answer: Z

---

### 32. BIOLOGY

Writer: William Chan

#### Toss Up: Multiple Choice

In plants, male gametes are produced by the

- W) ovary
- X) pistil
- Y) antheridium
- Z) archegonium

Toss Up Answer: Y

---

#### Bonus: Multiple Choice

The deuterostomes differ from protostomes in all of the following respects EXCEPT:

- W) early cleavage of the zygote
- X) ultimate function of the opening to the archenteron
- Y) number of germ layers in the developing embryo
- Z) embryonic origin of the mouth

Bonus Answer: Y

---

### 33. BIOLOGY

Writer: William Chan

#### Toss Up: Multiple Choice

All of the following are found in both roots and stems EXCEPT:

- W) Casparian strip
- X) primary phloem
- Y) primary xylem
- Z) secondary xylem

Toss Up Answer: W

---

**Bonus: Multiple Choice**

All of the following occur in a phototropic response EXCEPT:

- W) Shoots bend toward light
- X) Auxin is produced at the shoot tip and diffuses down the stem
- Y) Auxin accumulates on the shady side of the shoot
- Z) Auxin transport is unidirectional

**Bonus Answer: X**

=====

**34. BIOLOGY**

**Writer: William Chan**

**Toss Up: Multiple Choice**

Oogenesis in humans begins

- W) during embryonic development
- X) at birth
- Y) at puberty
- Z) monthly during the menstrual cycle

**Toss Up Answer: W**

=====

**Bonus: Multiple Choice**

In birds and mammals, gastrulation begins at the

- W) trophoblast
- X) blastodisc
- Y) blastocyst
- Z) primitive streak

**Bonus Answer: Z**

=====

**35. BIOLOGY**

**Writer: Shamaul Dilmohamed**

**Toss Up: Multiple Choice**

What hormone is an antioxidant, forms cadmium with other metals, and is produced to help regulate the circadian cycle for animals?

- W) Epinephrine
- X) Thyroxine
- Y) Calcitonin
- Z) Melatonin

**Toss Up Answer: Z**

=====

**Bonus: Short Answer**

Myasthenia gravis is a disease characterized by muscle weakness and fatigue, and is caused when antibodies inhibit a chemical in the human body. What is this chemical?

**Bonus Answer: Acetylcholine**

=====

**36. BIOLOGY**

**Writer: Shamaul Dilmohamed**

**Toss Up: Multiple Choice**

If the recessive allele of gene A is epistatic to gene B, what is the phenotypic ratio of the two genes?

W) 9:3:3:1

X) 12:4:3

Y) 9:4:3

Z) 9:7

**Toss Up Answer: Y**

---

**Bonus: Short Answer**

What genetic structure is responsible for the metabolism of lactose in E. Coli?

**Bonus Answer: the lac operon**

---

### 37. BIOLOGY

**Writer: Shanjeed Ali**

**Toss Up: Short Answer**

How many ATP molecules are produced by the Calvin cycle?

**Bonus Answer: 0**

---

**Bonus: Short Answer**

How many ATP molecules are used in the Calvin cycle to make one glucose molecule?

**Bonus Answer: 18**

---

### 38. BIOLOGY

**Writer: Ahmad Alnasser**

**Toss Up: Multiple Choice**

Who is considered the father of paleontology?

W) Marquis de Condorcet

X) George Cuvier

Y) Marie Antoinette

Z) Auguste Compte

**Toss Up Answer: X**

---

**Bonus: Short Answer**

List the taxonomic groups from least to most specific

**Bonus Answer: KINGDOM, PHYLUM, CLASS, ORDER, FAMILY, GENUS, SPECIES**

---

### 39. BIOLOGY

**Writer: Amrit Hingorani**

**Toss Up: Multiple Choice**

Three bony shelves that project inferiorly in the nasal cavity are called

W) paranasal sinuses.

X) nasal conchae.

Y) the greater wing.

Z) the crista galli.

**Toss Up Answer: X**

---

**Bonus: Multiple Choice**

The olfactory foramina are found in the

W) nasal septum

X) cribriform plate

Y) hard palate

Z) lacrimal bone

**Bonus Answer: X**

=====

## 40. BIOLOGY

**Writer: Amrit Hingorani**

**Toss Up: Multiple Choice**

Which of these bones is part of the axial skeleton?

W) rib

X) clavicle

Y) coxa

Z) femur

**Toss Up Answer: W**

=====

**Bonus: Multiple Choice**

A small, flattened articular surface is a

W) facet

X) fossa

Y) tuberosity

Z) ramus

**Bonus Answer: W**

=====

## 41. BIOLOGY

**Writer: Amrit Hingorani**

**Toss Up: Multiple Choice**

The general term for a depression in a bone is

W) fossa

X) canal or meatus

Y) facet

Z) foramen

**Toss Up Answer: W**

=====

**Bonus: Multiple Choice**

The suture that separates the parietal bones from the occipital bone is the...

W) coronal suture

X) lambdoid suture

Y) sagittal suture.

Z) squamous suture.

**Bonus Answer: X**

=====

## 42. BIOLOGY

**Writer: Aaron Gee**

**Toss Up: Multiple Choice**

In living cells, chemical processes, such as synthesis, all require the action of

W) specialized antibiotics

X) hormones

- Y) salts  
Z) biological catalysts

**Toss Up Answer: Z**

---

**Bonus: Short Answer**

The process of meiotic cell division in a human male usually forms what?

**Bonus Answer: Four monoploid cells**

---

**43. BIOLOGY**

**Writer: Joyce Lei**

**Toss Up: Short Answer**

What sequence on the mRNA of specific proteins determines whether or not the ribosome translating the mRNA will be bound to the rough endoplasmic reticulum?

**Bonus Answer: Signal sequence (OR targeting signal, localization signal, localization sequence, transit peptide, or leader sequence)**

---

**Bonus: Short Answer**

What are the three types of articulating vertebrae in the human vertebral column?

**Bonus Answer: Cervical, thoracic, and lumbar vertebrae**

---

**44. BIOLOGY**

**Writer: Joyce Lei**

**Toss Up: Multiple Choice**

What structure is present in cilia and flagella?

- W) 9+0  
X) 9+1  
Y) 9+2  
Z) 9+3

**Toss Up Answer: Y**

---

**Bonus: Short Answer**

Dicots feature vascular bundles arranged in what formation within the stem?

**Bonus Answer: Arranged in a ring.**

---

**45. BIOLOGY**

**Writer: Joyce Lei**

**Toss Up: Multiple Choice**

Which of the following is a ground tissue with thick secondary cell walls reinforced with lignin?

- W) Collenchyma  
X) Parenchyma  
Y) Cleochyma  
Z) Sclerenchyma

**Toss Up Answer: Z**

---

**Bonus: Short Answer**

What anatomical structure is a projection of the cell membrane used for phagocytosis?

**Bonus Answer: Pseudopods/pseudopodia**

---

**46. BIOLOGY**

**Writer: Joyce Lei**

**Toss Up: Multiple Choice**

Which of the following is a neurotransmitter important for the functioning of myofilaments?

- W) Dopamine
- X) Acetylcholine
- Y) Serotonin
- Z) Acetaminophen

**Toss Up Answer: X**

---

**Bonus: Multiple Choice**

Which of the following is not a layer of the epidermis in thin skin?

- W) Stratum corneum
- X) Stratum lucidum
- Y) Stratum spinosum
- Z) Stratum basale

**Bonus Answer: X**

---

**47. BIOLOGY**

**Writer: Joyce Lei**

**Toss Up: Multiple Choice**

Which of the following proteins is involved in forming the cleavage furrow of a cell during cytokinesis?

- W) G-coupled proteins
- X) Keratin
- Y) Myosin
- Z) Tubulin

**Toss Up Answer: Y**

---

**Bonus: Short Answer**

Name the method in which a new species develops due to a population separated from one another by geographical isolation.

**Bonus Answer: Allopatric speciation (OR geographic speciation)**

---

**48. BIOLOGY**

**Writer: Shamaul Dilmohamed**

**Toss Up: Multiple Choice**

Which of the following genetic diseases is not matched correctly with the type of inheritance it has?

- W) Hemophilia; X-linked recessive
- X) PKU; Autosomal dominant
- Y) Sickle cell anemia; Autosomal recessive
- Z) Rett Syndrome; X-linked dominant

**Toss Up Answer: X**

---

**Bonus: Short Answer**

What are the names for the two processes that, respectively, inhibit and promote gene expression by regulating access to a chromosome?

**Bonus Answer: Methylation; Acetylation (only accept this order)**

---

**49. BIOLOGY**

**Writer: Siam Muquit**

**Toss Up: Multiple Choice**

Where might a proteasome be found?

- W) Nucleus
- X) Plasma membrane
- Y) Extracellular Matrix
- Z) Lysosome

**Toss Up Answer: W**

---

**Bonus: Short Answer**

Which small protein tags other proteins for degradation?

**Bonus Answer: Ubiquitin**

---

**50. BIOLOGY**

**Writer: Amrit Hingorani**

**Toss Up: Multiple Choice**

In which fluid-filled cavity do organs develop in organisms such as earthworms?

- W) Ring
- X) Column
- Y) Coelom
- Z) Peritoneal cavity

**Toss Up Answer: Y**

---

**Bonus: Short Answer**

What is the specific name for the motion that pythons and boas undergo?

**Bonus Answer: Rectilinear Motion**

---

**51. BIOLOGY**

**Writer: Siam Muquit**

**Toss Up: Multiple Choice**

Which of the following refers to the fact that when we have experienced a conditioned stimulus by itself many times, it can be difficult to later condition to another stimulus?

- W) Blocking
- X) Dormant Inhibition
- Y) Extinction
- Z) Latent Inhibition

**Toss Up Answer: Z**

---

**Bonus: Short Answer**

What is the corepressor molecule in the trp operon?

**Bonus Answer: tryptophan**

---