

## TOSS-UP

1) Cell Biology- *Multiple Choice* Why are scaffolding proteins useful?

- W) They anchor the cell in place
- X) They help to form the extracellular matrix
- Y) They provide a network for motor proteins to move on
- Z) They increase the efficiency of signal transduction

ANSWER: **Z) They increase the efficiency of signal transduction**

---

## BONUS

2) Anatomy and Physiology - *Short Answer* Indicate all of the following 4 drugs or toxins that are correctly matched with their mechanism of action:

- 1) local anesthetics - block voltage gated sodium channels
- 2) sarin - inhibits acetylcholine release
- 3) tetanus - blocks SNARE proteins at excitatory synapses
- 4) strychnine - blocks glycine receptors

ANSWER: 1 and 4

---

## TOSS-UP

3) Ecology - *Multiple Choice* Which of the following is TRUE regarding speciation?

- W) Allopatric speciation can be due to habitat differentiation
- X) Sympatric speciation is due to geographic separation
- Y) Speciation occurs over short spans of time
- Z) Allopatric speciation is more common than sympatric

ANSWER: **Z) Allopatric speciation is more common than sympatric**

## BONUS

3) Ecology - *Short Answer* Sean is studying a certain population of bacteria doubles in size every 3 days. The starting population is 150 bacterial cells. Given this information, answer the following 2 questions:

- 1) How many cells will there be in 9 days?
- 2) Is this bacteria classified as a R-selected or K-selected species?

ANSWER: 1) 1200 2) R selected

---

### TOSS-UP

4) Biochemistry - *Multiple Choice* Glucose monomers in cellulose are linked by beta-glycosidic bonds. This type of linkage is also found in which other polysaccharide?

- W) amylose
- X) glycogen
- Y) chitin
- Z) amylopectin

ANSWER: Y) chitin

### BONUS

4) Biochemistry - *Short Answer* Your friend is on the health grind and has been drinking smoothies of pure protein, glucose, and animal fat in order to get his nutrients while avoiding all artificial additives. He woke up ready to drink his protein, but then realized that he mixed up his smoothies! You decide to run some tests to determine the identity of each smoothie and you record the results of the experiments in the table below. Give the identities of smoothies 1, 2, and 3, in that order, as either protein, glucose, or animal fat.

|             | Biuret's test | Sudan's test | Iodine's test |
|-------------|---------------|--------------|---------------|
| Smoothie #1 | Blue          | Red-orange   | Light orange  |
| Smoothie #2 | Magenta       | Clear        | Light orange  |
| Smoothie #3 | Blue          | Clear        | Light orange  |

ANSWER: 1) animal fat 2) protein 3) glucose

---

## TOSS-UP

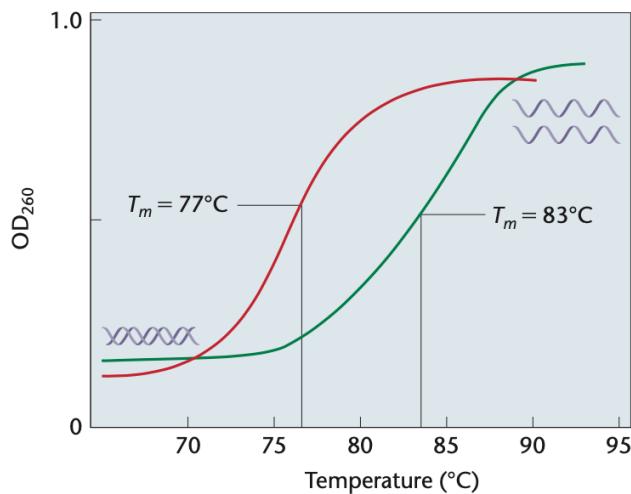
5) Genetics - *Short Answer* Small interfering RNA and microRNAs are two types of noncoding RNA that play important roles in cells. Identify all of the following statements that are true regarding the actions of siRNA and miRNA:

- 1) both are involved in the formation of an RNA-induced silencing complex
- 2) miRNAs are synthesized when double stranded RNA is detected in a cell
- 3) siRNA can only inactivate mRNA strands that they are fully complementary to

ANSWER: 1 and 3

## BONUS

5) Genetics - *Short Answer* The following graph shows the change in UV absorption of 2 different strands of DNA as they are heated. Does the strand indicated by the red line or the green line have a higher adenine content?



ANSWER: The Red Line

---

## BONUS

6) Biochemistry- *Short Answer* Predict three clinical effects from complete albinism. In addition, name the enzyme one must lack to have the aforementioned disorder.

Potential ANSWERS: **Hypopigmentation, Vision defects, Photophobia, Increased risk for skin cancer; tyrosinase**

---

## **TOSS-UP**

7) Ethology - *Short Answer* What is the name of a study in which the young of one species is brought up by another species to understand the influence of parental care on species behavior?

ANSWER: cross-fostering study

## **BONUS**

7) Ethology - *Short Answer* Identify the following types of mating systems where you would expect to see sexual dimorphism 1) promiscuous 2) monogamy 3) polyandry 4) polygyny

ANSWER: 3 and 4

---

## **TOSS-UP**

8) Ethology - *Short Answer* What is the name for the courtship behavior exhibited by some birds, mammals and insects that is an aggressive display of males to entice females?

ANSWER: lek or lekking

## **BONUS**

8) Ethology - *Short Answer* Male fiddler crabs participate in courtship behaviors only during certain times of the month. What external stimulus do they base their mating off of?

ANSWER: Lunar cycles

---

## **TOSS-UP**

9) Biosystematics - *Multiple Choice* Jawless fishes, belonging to the supergroup Agnatha, do not include which organism?

- W) Hagfish
- X) Lamprey

- Y) Coelacanth
- Z) Conodont

ANSWER: Y) Coelacanth

---

### **TOSS-UP**

10) Genetics - *Multiple Choice* Nucleotide Excision Repair is a DNA repair mechanism. Which of the following is not true about nucleotide excision repair?

- W) DNA glycosylases remove mismatched base pairs
- X) bulky lesions are detected
- Y) pyrimidine dimers are removed
- Z) it involves the products of the *uvr* genes

ANSWER: W) DNA glycosylases remove mismatched base pairs

### **TOSS-UP**

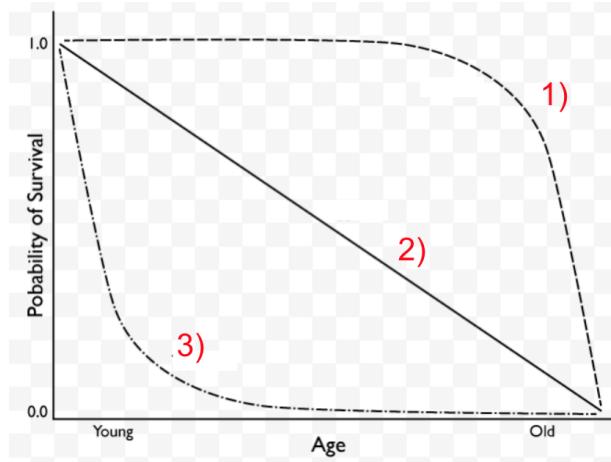
11) Ecology - *Multiple Choice* Which of the following factors would most likely affect a frog population drastically?

- W) Weather phenomena
- X) Disease
- Y) Predation
- Z) Resource Scarcity

ANSWER: W) Weather phenomena (density independent factor)

### **VISUAL BONUS**

11) Ecology - *Short Answer* A certain graph is shown on the screen. Answer the following two questions:



- 1) What is the name for this type of graph?
- 2) Match the following organisms with the three different curves: Human, Frog, Birds.

ANSWER: 1) Survivorship Curve, 2) Human: 1, Frog: 3, Birds: 2