

BIOL 1114 Exam #4 (Preview) December 11, 2018

Use a #2 pencil to fill in the information on your NCS answer sheet.

- 1) Enter your **last name** and **first name** as indicated and darken the corresponding circles
- 2) Enter your **CWID** in the spaces indicated for "Student ID" and darken the corresponding circles.
- 3) Enter **1834** in the spaces indicated for "**Course number**" and darken the corresponding circles.
- 4) Enter the **form** of the exam **001** or **002** in the spaces indicated for "**SEC**" and darken the corresponding circles
- 5) Write your **O-Key Account Username** above the words "Last Name".

mRNA -Codon- to - Amino - Acid Decoder Chart									
1 st Letter	2 nd Letter								3 rd Letter
	U		C		A		G		
U	UUU	Phenylalanine	UCU	Serine	UAU	Tyrosine	UGU	Cysteine	U
	UUC		UCC		UAC		UGC		C
	UUA	Leucine	UCA		UAA	STOP	UGA	STOP	A
	UUG		UCG		UAG		UGG	Tryptophan	G
C	CUU	Leucine	CCU	Proline	CAU	Histidine	CGU	Arginine	U
	CUC		CCC		CAC		CGC		C
	CUA		CCA		CAA	CGA	A		
	CUG		CCG		CAG	CGG	G		
A	AUU	Isoleucine	ACU	Threonine	AAU	Asparagine	AGU	Serine	U
	AUC		ACC		AAC		AGC		C
	AUA		ACA		AAA	AGA	A		
	AUG	Methionine: START	ACG		AAG	Lysine	AGG	Arginine	G
G	GUU	Valine	GCU	Alanine	GAU	Aspartate	GGU	Glycine	U
	GUC		GCC		GAC		GGC		C
	GUA		GCA		GAA	GGA	A		
	GUG		GCG		GAG	GGG	G		

important equations: r = b - d G = rN G = rN [(K-N)/K]

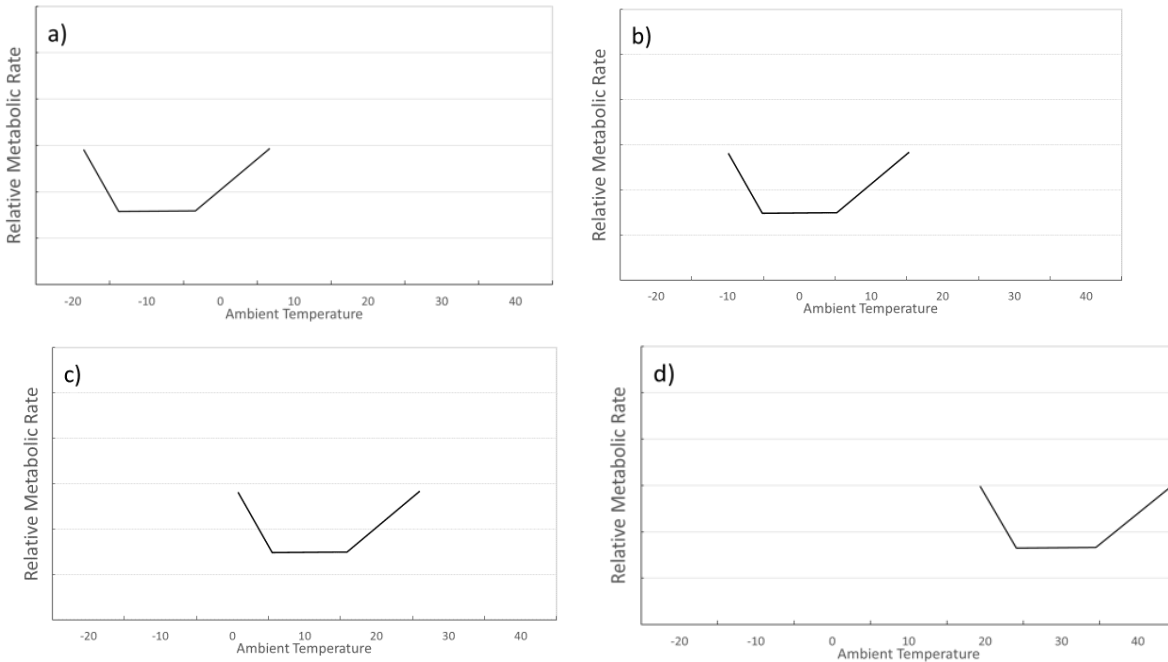
Manatees have a thick insulating layer of blubber to reduce the amount of heat lost to the water. Most marine mammals have trouble obtaining water they can drink because seawater is much saltier than their body fluids. They extract what water they can from their food. In a hypothetical population isolated for generations, the manatees have a source of drinkable freshwater and shorter nephron loops than other manatees. Manatees use their own flatulence to regulate their height in the water column.

To create farmland, Florida started diverting excess water from Lake Okeechobee to the coasts, reducing the flow through the Everglades to the ocean. Dr. Larry Brand, from the University of Miami has attributed the increase in red tide to diversion of water through farmland. When the algae *Karenia brevis*

Preview Preview Preview Preview Preview Preview Preview Preview

die, they release a neurotoxin that causes respiratory paralysis. A red tide, formed of a huge *K. brevis* population has killed 97 manatees in the Gulf of Mexico in 2018, so far. There were 6,300 manatees off the coast of Florida at the start of the year. In 1991 there were 1,267 manatees, the current population is 6,300.

Manatees in the winter are frequently found in the warm water discharge areas near powerplants.



Pat was exposed to bacterial pneumonia several years ago and contracted the disease. After several weeks Pat recovered from the disease. Exposed to the disease several years later, Pat recovered more rapidly. However, as Pat aged, subsequent exposures resulted in lengthier bouts of pneumonia and Pat's doctor's decision to treat Pat's illness with antibiotics. After several treatments, the antibiotics failed. Pat's doctor prescribed the antibiotic levofloxacin, which was effective, but, resulted in Pat experiencing bouts of paralysis in some muscles. Pat learned that levofloxacin interferes with enzymes involved in the replication of the circular DNA found in bacteria. Unfortunately, in addition to affecting bacteria, it appears that levofloxacin can pass through human nerve cells and affect DNA replication in mitochondria but not in the nucleus.

Grand Lake o' the Cherokees in Oklahoma supports a diverse food web that includes the food chain: algae, zooplankton that eat algae, and fish that eat zooplankton and birds that eat those fish. The lake is surrounded by agriculture and occasionally experiences algal blooms. Some of the blooms are formed by blue green algae, which can produce neurotoxins that affect fish and humans. Grand lake is also downstream of Tar Creek, which is a former mining site that has a lot of heavy metal pollution.

Preview Preview Preview Preview Preview Preview Preview Preview

One neurotoxin produced by blue-green algae causes muscle spasms and convulsions.
Runoff of fertilizers from nearby agricultural fields contributes to algal blooms on Grand Lake.

A scientist measures the density of algae in water samples and observes that the algae increase from 50 algae/ μL to 500 algae/ μL in one month.

In 2018's Marvel Film *Avengers: Infinity War*, the villainous Thanos assumes that as the populations of the worlds in the galaxy reach a certain size, for every being born one must die from starvation, war, or the build-up of waste. Because he finds this unacceptable, he attempts to use the power of the ancient infinity stones to wipe out half of the population of the known universe.

Let's assume the fictional Marvel hero Spider-Man became an ectotherm when the radioactive spider's bite provided his other arachnid-derived superpowers.

The fictional Marvel character Groot is a walking, talking tree.

Combustion of fossil fuels increases the concentration of atmospheric CO_2 , a hypothesized factor in global warming. Prof. Klaus Lackner (Columbia University) has proposed building ten million "air capture machines" to remove carbon dioxide (CO_2) from our atmosphere. Each machine would chemically remove ten tons (9072 kg) of CO_2 daily. This would reduce the current level of 389 parts per million (ppm) of CO_2 by 5 ppm. This proposal has generated enormous controversy.

Near each air capture machine, the concentration of CO_2 would drop rapidly.

Biochemists develop an herbicide that kills weeds by inhibiting glucose synthesis.

A fragment of DNA at the end of a gene with the sequence GCT GCA CCG TGA ACC ATT undergoes a point mutation at position #17 to: GCT GCA CCG TGA **ACT** ATT.

Neuropeptide Y [NPY], a very small protein in the hypothalamus, stimulates appetite. The mRNA translated to produce NPY is 114 nucleotides long. An animal's appetite increases due to continuous NPY production.

The Bombay phenotype is a rare blood disorder where the red blood cells lack A and B antigens giving a person type O blood no matter what alleles (A, B or O) they have for the *ABO* gene. The Bombay phenotype is an autosomal recessive disorder caused by mutations in the *FUT1* gene. The *FUT1* gene produces an enzyme necessary to form the A and B antigens. The template strand of the *FUT1* gene contains 1095 **nucleotides**.

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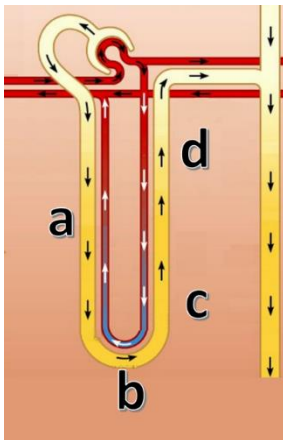
A man and a woman do not express the Bombay phenotype. Because their fathers both had the Bombay phenotype, they consulted geneticists about having children. The man had type A blood (his parents were both genotypically type AB). The woman had type B blood (her parents were both genotypically type AB).

All your body cells develop by mitosis from a single fertilized egg. Yet each type of cell produces different proteins depending on the main function of that cell.

A scientist discovers overweight mice with what she hypothesizes is a new mutation in the leptin gene ("O").

In a strain of mice that does not gain weight, the scientist finds that rate of O_2 consumption is higher than normal even though the rate of ATP production is lower.

The scientist notices that female mice are more likely to mate with normal male mice than with those with the allele that leads to being overweight.



In the relatively short time of 30 million years, many species of kangaroos appeared in Australia as warm to cool climate changes resulted in changes in the environment.