Shamrocks
There are over 300 species of clovers. Differences in species are caused by random changes in DNA called _________________.

The color green is reflected by the pigment ________________, which absorbs the colors ___________ and _______________. The trapped light is used to power an enzyme which splits water apart, creating H+ and the byproduct Oxygen. This ________________ reaction in photosynthesis ultimately produces the energy molecule ____________.

Clover plants help to add nitrogen to the soil. An organism’s role in the environment is its N_________. They encourage nitrogen fixing bacteria to live on their roots. These bacteria take nitrogen from the air and add it to the soil, using special proteins called _________________. Nitrogen is used to build amino acids, which are combined together at the _______________________ to make _________________.

Nitrogen is also used to make nucleotides, which are joined to make the nucleic acids DNA and _______.

Clover is tetraploid, meaning it has 4 of each chromosome. A clover pollen gamete has only ___ chromosomes, and the egg cell has ___.

Humans, on the other hand, are diploid, with ___ of each chromosome, and our gametes are haploid, meaning they have ___ of each chromosome.

One shamrock would be an organism.
A group of shamrocks are a _____________________.

The shamrocks, trees, sheep, and Irish people are a _______________________.

All of these plus non-living abiotic rocks and rivers make up the _______________________.

Snakes
Ireland does not have any native snake species. Reptiles are cold blooded, and do not do well in cold temperatures.

Why are cold temperatures bad for a cell? _____________________________________________.

Mammals are warm blooded, and use the messenger hormone Thyroxin to rev up their ATP synthase motors to heat up the cell, with mitochondria reaching 120 F. The two processes that occur in the mitochondria are the ________________ which makes ___ ATP and the ___________ which makes ______ ATP.

Leprechauns
The folklore of Leprechauns began in the 1300’s with the saga of Fergus mac Léti, about a king who is kidnapped by little mischievous people.

Achondroplasic dwarfism is a Dominant disorder which results in decreased mitosis in bone cartilage.

The four phases of mitosis are ____________, ____________, ____________, _____________.

Draw a punnet square cross of 2 heterozygous individuals:
Many Irish people have characteristic red hair. The red hair pigment Pheomelanin (left) is built by the enzyme Tyrosinase (right).

Explain how the Tyrosinase gene results in red hair color using the following terms:

**Transcription:**
Transcription, RNA polymerase, DNA, mRNA

**Translation:**
translation, ribosome, mRNA, codon, tRNA, anti-codon, amino acid, protein, Tyrosinase

**Enzyme:**
enzyme, substrate, active site, Pheomelanin

Here is part of the actual sequence of the Tyrosinase Gene TYR1. Transcribe it to mRNA

ACACTACCT

And use a codon chart to translate it to amino acids: ___________   ____________ ____________
St. Patrick’s Day Part II

**Ireland**
The earliest archaeological evidence of humans in Ireland is relatively recent at 12,500 years ago.
Until 12,000 years ago Ireland was mostly covered with ice.
Water sticking to water is **________________**.
Ancient Ireland forests are mainly oaks, so the biome is a **D_______________** forest.
The first evidence of humans is a butchered bear bone found in a cave. Bears will **H____________** during winters, slowing down all their chemical reactions, their **M________________**.
The maximum number of organisms that can live in an environment is the **Carrying C____________**.
Evidence of pottery begins 10,000 years ago. To create pottery, water is added to clay. Water moves towards a **H________________** solution. Water sticking to clay is an example of **A____________**.

There is evidence of agriculture in Ireland 6,000 years ago. There were sheep, cows, wheat, and barley. **Draw** a food chain including: grass, cows, humans. Be sure the arrow always points towards the predator

Now **label** each organism with the correct term: producer, primary consumer, secondary consumer

Only _____ % of energy is passed up the food chain.
Each level of the food chain is the **T____________** level.
All of the physical weight of the living organisms in an ecosystem is the **B____________**.
Plants produce their own energy, so are considered **A________________** while the humans and herbivores that eat them are **H________________**.

Wheat produces glucose in the **________________** reaction of photosynthesis. This reaction occurs in the **__________** of chloroplasts. CO2 and ATP are consumed and glucose is produced.

A relationship between wheat and humans where both benefit (wheat plants are spread and humans receive glucose) is a symbiotic **M________________** relationship.

Glucose from wheat is broken down in the cytoplasm of cells in **G____________** which makes _____ ATP, then in the Mitochondria Krebs makes 2 and the ETC makes 32, so _____ total.

Barley was brewed into beer using **A________________** respiration which yeast use to produce alcohol, CO2, and the energy molecule **______**. Yeast are unicellular, but they are not prokaryotes, they are **________________**.
**Potatoes**
In the mid-1800’s potatoes in Ireland were afflicted by a virus.
Are viruses considered living? _________
A virus consists of a protein capsid shell and the genetic information molecule D____ inside.
The potatoes had low genetic variability, so most of the crops were susceptible.
A mutation is a __________________________________________________
Explain how the potato crops would have changed over time due to natural selection if there was more genetic variability:
___________________________________________________________________________________

**Folklore**
Irish Celtic folklore includes tales of warriors and fairies. It was said that fairies lived under mushrooms, which are part of the F____________ kingdom. Mushrooms secrete enzymes outside themselves and absorb nutrients, so they are H_________________ rather than autotrophs.
Mushrooms are not plants, their cells do not have Ch___________________, but they do have cell walls made of chitin. Since their enzymes break down dead plant matter they are considered D________________________. Enzymes modify S_______________ at the enzyme’s A____________________.
Halloween first began as an Irish Celtic tradition.

**St. Patrick**
It is not known exactly when St. Patrick lived, but it may have been the late 400’s A.D. St. Patrick was revered as a Christian patron saint of Ireland as early as the 600’s A.D.

**Rainbow**
Water droplets refract white light into its component colors, creating a rainbow.
Water sticks to other water molecules in droplets because water is a P___________ molecule, resulting in C_________________. Water drops can also form around dust molecules, an example of A___________________.
In the water cycle we call the forming of water drops C______________________, followed by rain, or P________________________. Water enters hypertonic roots in the process of O_________________. Water exits leaves in Transp_________________. Water also enters the air after hot molecules knock it loose from puddles, Ev____________________.

**Pot of gold**
Gold can be panned because of its high density. The solute in the pan is a H_____________________ solution and water adheres to the soil, freeing it from the gold.

**Calculate the value of a gallon of gold:**
1 gallon = 3785.41 cubic centimeters
1 troy oz = 1.61 cubic centimeters
1 troy oz = $1288.59

$_________________________________