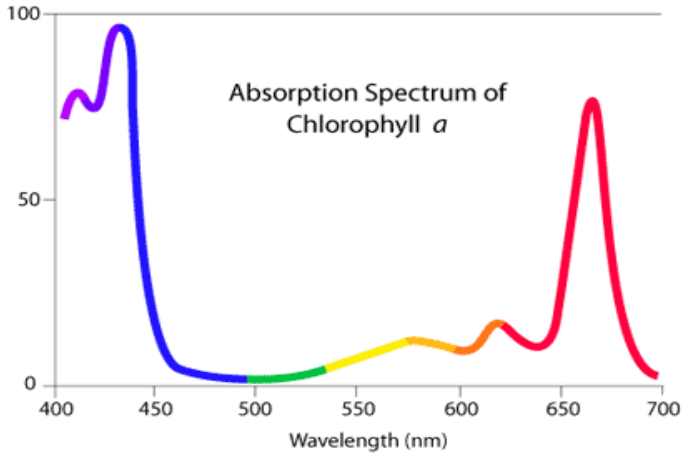
Remember:

Use a #2 pencil to fill in the information on your NCS answer sheet. Put your **O-Key Account Username** in the boxes indicated **for LAST NAME** and darken the appropriate circles. **Write your Name (Last, First)** and "**Star**" **or "NoStar" in the space above the boxes containing your O-Key Account Username**. Darken the **(S)** or **(N)** in the **last column of the name circles**. Enter the number **1312** and **darken the corresponding circles** in the **first 4 columns** of the **"Student ID."** Failure to perform this correctly will incur a **-10pt handling fee**. Read all questions and answers ***carefully*** before choosing the **single BEST response** for each question. Feel free to ask the instructor for clarification.

Observe the graph to the right:

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Tobacco plants synthesize nicotine, which is toxic to most insects. The tobacco hornworm (a moth caterpillar) is an exception- it is resistant to nicotine. Nicotine acts similarly to the neurotransmitter acetylcholine.

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Dr. Toblerone studies a toxin found in the root of the barbasco plant, which native Zoque people in Mexico apply to a stream and paralyze fish for easy collection.

To understand the effects of the toxin on neuronal function, Dr. Toblerone collects fish and exposes some to equal amounts of the barbasco toxin, while keep other fish unexposed. The resulting data are summarized below.

| $Na^+$ gates | $K^+$ gates | $Na^+/K^+$ pump | Acetylcholine secretion | Acetylecholinesterase secretion |
|---|---|---|---|---|
| No effect | No effect | No effect | Decreased | Increased |

Dr. Toblerone exposes fish from two streams in Mexico to the barbasco toxin. To his surprise, he finds that fish from one stream are not paralyzed even after repeated application of the toxin. He finds that this stream was the site of a centuries-old religious ceremony where the natives repeatedly applied the barbasco toxin to harvest fish and offer it to appease their gods.

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Dr. C. Al. Ben-Sun has developed a new technique for measuring the sugar content of single cells using microelectrodes. He tested his new instrument by placing *Anacharis* (an aquatic plant) in test tubes containing water and calcium carbonate to provide an abundant supply of carbon dioxide ($CO_2$). Affixed to the tube is a LED light source that can be controlled to produce a full spectrum of light or light of particular wavelengths all at variable intensity (brightness).

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Genetic evidence supports the conclusion that the eight species of land crabs found in Jamaica share a common marine ancestor that invaded the land only about 4 million years ago when the island submerged and re-emerged from the sea. Among these are the "snail-shell crab", in which the females raise their young in empty snail shells which they fill with water from dew allowing their aquatic larvae to survive and the “bromeliad crab”, which raises its young in water-filled bromeliads (a plant that grows in branches of trees), where they are safe from most predators. Those females remove decaying materials, circulate and oxygenate the water, place shells into the water to provide calcium and control pH, and kill aquatic insects that prey on larvae. Feces from the larvae and other organisms living in the water provide the bromeliads nutrients, which are lacking in the soil in the branches of trees.

To transport some of the snail shell crabs back to her lab in Stillwater, she places them in sealed, dark containers with ice. Some of the containers are placed too close to a heat source and the ice melts as the containers warmed to room temperature. The crabs kept on ice survived; the others did not.