

## Script for FLL Innovation “Play”

**Chloe D.:** Today’s basketball is so tiring and I’m so hungry. Can you cook me some meat?

**Melody:** Don’t always eat meat, eat some vegetables!

**Chloe D.:** Okay, then can you get me some lettuce we bought from the grocery store, please?

**Melody:** Here you go... EW! Why is it so moldy? We just bought it 4 days ago!

**Chloe D.:** Oh, I know. We can get some fresh pea shoots from the Superpowered Girls Vertical Farming.

**Melody:** Wait, what? What is vertical farming? A farm that is vertical?

**Gabby:** You are on the right track. Vertical farming, a.k.a., smart farming is a type of modern agriculture technology that allows leafy greens and microgreens to grow within a controlled environment. It saves a lot of farmland and also can reduce the water usage up to 95%.

**Jacqueline:** 95%?! That’s amazing! I really like this idea of vertical farming. Can you explain a bit more?

**Gabby:** Sorry, that’s all I know from the internet research. If you want to know more, maybe we can ask some experts to get their insights.

**Jacqueline:** That sounds like a good idea, but do you know anyone?

**Gabby:** Unfortunately no... But you know what? Let’s make some cold calls and email all companies doing vertical farming in Canada.

**Jacqueline:** Alright! Let’s work on it.

**Chloe D.:** One month later...

**Melody:** ring ring ring...

**Vikki:** Hello, are these the Superpowered girls?

**Renee:** Yes, my name is Renee, one of the team members. May I ask who's calling?

**Vikki:** Oh, my name is Jerry Dover, Vice President of Good Leaf Farms. I heard your team is interested in smart farming technologies. I'm happy to help you out.

**Renee:** Girls! Guess who's calling? It's Mr. Jerry Dover, VP of Goodleaf Farms!

**Ariel:** Oh, look, I did some quick research online. They are the biggest vertical farming company in Canada.

**Renee:** Thank you so much Mr. Dover for offering your help. Can we have an interview so you can teach us something more about vertical farming?

**Vikki:** Yes, of course. I'll schedule it.

**Chloe D.:** A few weeks later.

**Vikki:** Hello Girls.

All girls: Hello Mr. Dover.

**Vikki:** Look what I brought for you today.

**Ariel:** Woah, some fresh pea shoots and lettuce! It tastes so fresh and delicious.

**Vikki:** Do you know why they taste so good?

**Gabby:** I know, it's because of the carbon cycle. Actually, all living things are carbon based. Carbon atoms bond with other atoms to form chains such as proteins, fats, and carbohydrates which in turn, provides other living things with nourishment.

**Renee:** And, plants need to go through a photosynthesis process to grow. During this process, plants take in carbon dioxide (CO<sub>2</sub>) and water (H<sub>2</sub>O) from the air and soil. Within the plant cell, the water is oxidized, while the carbon dioxide is reduced. This transforms the water into oxygen and the carbon dioxide into glucose.

**Vikki:** Wow, that's amazing you girls know this already. But do you know the problem of traditional farming?

**Chloe W.** According to our research, traditional farming uses a lot of farmland and water, and it generates a lot of Greenhouse Gas emissions (GHG). The environment gets damaged because of the wide usage of pesticides and herbicides. And, the farm is usually far away from the city and the transportation system is very complicated.

**Ariel:** Vertical farming can solve these problems because the microgreens can be raised in a controlled space. And you can stack them on top of each other.

**Vikki:** But, girls, we have a problem. Vertical farming takes a lot of energy to simulate the sun. Do you think you can help us by using less energy?

**Jacqueline:** Alright! Let's work on it.

**Chloe W. :**We should build our own lights first so we can take full control of the on/off time and power. According to research, the purple light gives the highest yield and is the most effective light spectrum. We should also use LED lights because it's very energy efficient.

**Melody:** Nice, but how do we get a purple light.

**Ariel:** I know, we can mix the RED with the BLUE, then we will have a purple light.

**Chloe D.:** Bingo! Let's solder those lights.

**Renee:** And let's build a frame to hold the lights.

**Gabby:** Oh, why is it so hot on the lights? Let's put them on a heat sink.

**Vikki:** Now, the last step. Let's use Arduino to control the current so we can manage the power into the lights.

**Vikki:** Now, we can plant our own vegetables, finally.

**Gabby:** Judges, here's our first batch of products. We'd like to share our idea with Mr. Dover and partner with Goodleaf farms to reduce their energy consumption.

**Renee:** We are also thinking of showcasing our vertical farming technologies to our school board, and to bring more girls like us into the engineering field.