

>> Sally: What are you working on?

>> Dude: I've got a great new idea.

I'm going to make cocoa beans that reproduce as fast as viruses.

That way, we'll have enough cocoa beans to make as much chocolate as we want!

>> Sally: You know how much I like chocolate!

Explain your project a little more.

How are you going to engineer this yummy idea?

>> Dude: Well viruses reproduce really fast so I thought I could take that part from a virus and put it into a cocoa plant.

>> Sally: Plants are pretty safe to work with but viruses can be dangerous.

Which virus were you thinking about using?

>> Dude: Well I read that Ebola virus has a short sequence that...

>> Sally: ...EBOLA!?!

Ebola is a bio-safety level FOUR agent.

>> Dude: Well the worst are level five, so I thought it was safe enough.

>> Sally: Level five?

There is no bio-safety level five.

You'd need lots and lots of training to work in any level three or four facility...

...and you'd have to wait a few years since they don't let minors in those labs.

>> Dude: DD: But there was this show I saw on TV where...

>> Sally: What you see on TV and in movies can be very deceiving.

But let's talk about all the bio-safety levels.

If we're going to make your viral cocoa beans, we need to come up with a way that keeps everyone safe, inside the lab and outside too.

>> Dude: OK.

I do know that biosafety is a combination of safe lab practices and techniques, wearing the right safety equipment, and working in a lab designed to contain the experiment.

But with biosafety level 1 that just means a room with screened windows and a door that closes.

That doesn't sound like much.

>> Sally: That's because BL1 experiments use only well-characterized microbes that don't make a healthy person sick.

But remember, there's no eating or drinking in the lab since you wouldn't want to eat your experiments.

>> Dude: When do I get to wear a lab coat like yours?

>> Sally: If you're working at biosafety level 2, you'll have to wear it, and gloves, too, since some BL2 agents can be infectious.

BL2 labs have impervious benches and most of the work is done in biological safety cabinets.

Lots of BL2 workers also get immunizations if they'll be working with certain agents.

>> Dude: I hate getting shots.

>> Sally: Well, not all level 2 agents require immunizations.

Really, the rules for BL1 and BL2 are pretty basic because the agents have minimal risk associated with them.

But let's think for a minute about what biosafety you'd need for your mash-up of a virus with a cocoa plant.

>> Dude: Well maybe more protective clothes, like the workers in bio-safety level 3 labs.

They wear full suits and maybe masks or something.

It's nothing I can't handle.

Imagine me in a space suit!

Very cool!

And think about how much chocolate we'll have!

>> Sally: Earth to Dude!

Level three agents are very serious, potentially lethal, and level four agents, like Ebola virus, have such a high lethal risk that there are only a few places in the world where they are studied.

Restrictions for working with these agents are very tight.

Everything entering or leaving BL3 and BL4 labs has to be decontaminated.

Sometimes the lab has to be in its own building to control foot traffic.

I know I don't want to work where there are double door entries and airlock rooms.

>> Dude: I think that sounds like fun...

>> Sally: ...If you are so excited about the protective clothing, we can always be overly cautious in a level 1 or 2 facility.

But can't we find another way to make more cocoa beans?

>> Dude: OK.

>> Sally: Maybe we can find another virus that's not so dangerous and we can keep working on your chocolate idea.

Let's start looking in here.